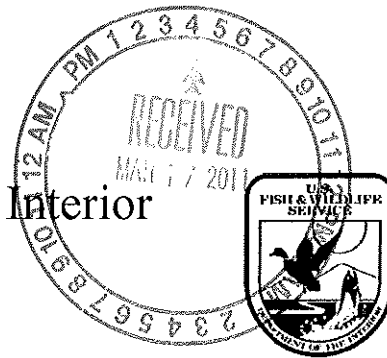


United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003



IN REPLY REFER TO:
81440-2011-F-0044

March 17, 2011

Matthew C. McMillen
Director of Environmental Compliance, Loan Guarantee Program Office
Department of Energy
1000 Independence Ave. SW, LP-10
Washington, D.C. 20585

Roxie Trost
Field Manager, Barstow Field Office
Bureau of Land Management
2601 Barstow Road
Barstow, California 92311

Subject: Biological Opinion on Mojave Solar, LLC's Mojave Solar Project, San Bernardino County, California (8-8-11-F-3)

Dear Mr. McMillen and Ms. Trost:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the Department of Energy's (DOE) proposed issuance of a loan guarantee to Mojave Solar, LLC for the construction, operation, and maintenance of the Mojave Solar facility and the Bureau of Land Management's (Bureau) proposed issuance of five right-of-way grants to Southern California Edison (SCE) for the telecommunication systems necessary for the operation of the Mojave Solar facility and their effects on the federally threatened desert tortoise (*Gopherus agassizii*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). Together, the Mojave Solar facility site and the installation of the fiber optic lines constitute the Mojave Solar Project. Because Mojave Solar LLC is a project company of Abengoa Solar Inc. (Abengoa), this biological opinion refers to the project proponent of the solar field as Abengoa. The proposed project involves construction, operation, and maintenance of a 1,765-acre solar power generating facility, the construction and operation of the Lockhart substation, and the installation of 3 fiber optic lines to connect the facility to the electrical grid. The DOE will maintain discretionary authority over the Mojave Solar facility for the duration of the loan; authority over SCE's fiber optic lines will be exercised by the Bureau. We received your electronic request for formal consultation on October 4, 2010.

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This biological opinion is based on information that accompanied your October 4, 2010, request for consultation (AECOM 2010), additional information available from the California Energy Commission's (CEC) permitting process, and clarification of the project description and desert tortoise translocation strategy obtained from DOE staff during the formal consultation process. This additional information includes the draft desert tortoise translocation plan (Karl 2011), staff assessment (CEC 2010a), supplemental staff assessment, part B (CEC 2010b). A complete record of this consultation can be made available at the Ventura Fish and Wildlife Office.

Consultation History

On November 23, 2010, we responded to your request for initiation of formal consultation with a memorandum that identified that the biological assessment had sufficient information to commence the consultation. We noted, however, that we required clarification on several issues and a final desert tortoise translocation plan to be approved by the Bureau and Service (Service 2010a, Blackford 2010). We provided comments on a draft desert tortoise translocation plan on December 7, 2010, and Abengoa submitted a new draft desert tortoise translocation plan December 20, 2010.

On March 2, 2011, we issued a draft biological opinion to the DOE and Bureau (Service 2011). We revised the draft biological opinion based on comments from the DOE, Bureau, Abengoa, and SCE.

Your request for consultation contained your determination that the proposed project is not likely to adversely affect critical habitat of the desert tortoise. Abengoa's component of the project (solar facility) does not occur within and would not affect desert tortoise critical habitat. SCE proposes to install a fiber optic line through 32.79 miles of the Fremont-Kramer Critical Habitat Unit between the Lockhart to Tortilla, Lockhart to Kramer and Kramer to Victor substations. Approximately 11.51 acres along the 32.79 miles of transmission line within critical habitat would be affected. The largest disturbed area in any single location would be approximately 0.1 acre. The disturbance would include the installation of fiber optic line hardware onto poles, establishing pulling and splicing sites, and placing new poles. The Description of the Proposed Action - Installation of Fiber Optic Lines section of this biological opinion and the biological assessment (AECOM 2010) contain additional information on the installation of the fiber optic lines. The disturbance would occur within the existing utility right-of-way, which supports one or more transmission lines and access roads for these lines.

Your request for formal consultation states that the loss of habitat would occur in "areas that are lacking in many of the primary constituent elements that are required of desert tortoise critical habitat." The biological assessment did not contain any specific information to support this assertion. To assist us in assessing whether we concurred with your determination, we evaluated each primary constituent element of critical habitat of the desert tortoise in light of the nature of the proposed action and our general knowledge of the condition of utility rights-of-way.

The first primary constituent element of desert tortoise critical habitat is sufficient space to support viable populations within each of the six recovery units and to provide for movement, dispersal, and gene flow. The 11.51 acres of disturbance would be distributed in small patches along 32.79 miles of transmission line; no single area of disturbance would exceed 0.1 acre. The effect of this amount of disturbed habitat would not be measurable within the context of the 518,000-acre critical habitat unit in terms of the amount of space available to desert tortoises to support viable populations and to provide for movement, dispersal, and gene flow.

The second primary constituent element is sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species. Installation is likely to remove at least some annual plants (i.e., forage species) at work sites if work is conducted when they are above ground). These activities are also likely to disrupt soil structure to some degree. The home range of a male desert tortoise is approximately 2 square kilometers (O'Conner et al. 1994, Duda et al. 1999, Harless et al. 2009); even if several points of disturbance associated with installation of the fiber optic line occurred within a single desert tortoise's home range, the disturbance of approximately 0.0004 square kilometer (for a single activity) would not substantially alter the quantity of forage species and the proper soil conditions within that home range. Additionally, we cannot quantify the amount of existing disturbance but we expect that at least some of the areas to be used for installation of the fiber optic line have been disturbed by previous activities associated with the construction, operation, and maintenance of the existing transmission line. Consequently, we expect that the installation of the fiber optic line would not have a measurable effect on the quality and quantity of forage species and the soil conditions to provide for the growth of these species

The third primary constituent element of desert tortoise critical habitat is suitable substrates for burrowing, nesting, and overwintering. Installation is likely to degrade, at least to some degree, substrates for burrowing, nesting, and overwintering. As we noted for the previous primary constituent element, the small size of the disturbed areas, the distribution of the disturbed areas over many miles of transmission line, and the likelihood that at least some of the work would occur in previously disturbed areas, we expect that the installation of the fiber optic line would not have a measurable effect on substrates for burrowing, nesting, and overwintering.

The fourth primary constituent element of desert tortoise critical habitat is burrows, caliche caves, and other shelter sites. Installation is likely to destroy burrows, if any are present in the work sites. Because of the small areas to be disturbed and the proximity of the work areas to an active road, we expect that few burrows would likely be affected. We expect that, given the habitat that the transmission line traverses and the nature of the work, caliche caves would not be affected. We have reached this conclusion because these caves generally occur in the banks of washes or other areas of steeper terrain; we expect that, because SCE does not need large areas to conduct its work, it would avoid areas of more rugged terrain. We are unaware of any other type of shelter site in this area, other than under shrubs, which we have discussed elsewhere. Consequently, we expect that the installation of the fiber optic line would not have a measurable effect on burrows, caliche caves, and other shelter sites.

The fifth primary constituent element of desert tortoise critical habitat is sufficient vegetation for shelter from temperature extremes and predators. We expect that the installation of the fiber optic line would not have a measurable effect on vegetation that desert tortoises may use for shelter from temperature extremes and predators. We have reached this conclusion because of the small areas to be disturbed along the 32.79 miles of transmission line and the fact that relatively few shrubs would be removed.

The sixth primary constituent element is habitat protected from disturbance and human-caused mortality. Disturbance related the installation of the fiber optic line would be temporary; the human activity associated with installation of the fiber optic line would not measurably alter the amount of disturbance that currently occurs in the area. Consequently, we expect that the installation of the fiber optic line would not have a measurable effect on this primary constituent element.

As a result of considering how the proposed action would affect each of the primary constituent elements, we have determined that the proposed action is not likely to adversely affect critical habitat of the desert tortoise. If the proposed action changes in a manner that may affect critical habitat, the DOE or Bureau should contact us as soon as possible to determine whether further consultation would be appropriate.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Introduction

The proposed solar facility site is located north of Highway 58, approximately 9 miles west of Hinkley, southwest of Harper Dry Lake, and south of an existing solar facility, Harper Lake Solar Electric Generating Station (SEGS VIII and IX). Abengoa proposes to construct 2 approximately 800-acre solar fields (Alpha and Beta), using single-axis-tracking parabolic trough solar collectors. Each independent solar field would produce 125 megawatts. The solar field and its associated facilities, including the Lockhart substation, encompass 1,765 acres, and are considered to be the solar facility site.

To integrate the energy generated by the Mojave Solar facility as it enters the electrical grid, SCE would install fiber optic lines on existing transmission lines. Fiber optic lines would be installed within 4 existing utility rights-of-way: between Lockhart and Tortilla substations (31 miles), between Lockhart and Kramer substations (16.39 miles), and between Kramer and Victor substations (37.89 miles). The connection between Lockhart and Tortilla would require a new right-of-way to be established from Lockhart to Hinkley, although transmission lines are already present along the route. We summarized the description of the proposed action from the biological assessment (AECOM 2010) and the staff assessment (CEC 2010a).

Construction of Mojave Solar Facility

Construction of the Mojave Solar facility would occur over approximately 26 months (AECOM 2010) and require a workforce of 830 to 1,162 people (CEC 2010a). Access to the facility during construction and operation would be via Harper Lake Road off of State Route 58.

Although the majority of Harper Lake Road is lined with desert tortoise exclusion fencing, some private lands and the intersections with utility crossings are not fenced. To reduce the amount of vehicle traffic along Harper Lake Road, Abengoa intends to use a bussing service from Barstow. With the exception of construction traffic along Harper Lake Road, all solar facility site construction would occur within desert tortoise exclusion fencing. The entire solar facility site, 1,765 acres, would be graded. Construction of the Alpha and Beta sites would include the installation of the parabolic trough solar collectors, a power block, an evaporation pond, and ancillary facilities. Additional components of the solar facility would include a natural gas pipeline, an onsite transmission and interconnection facility (Lockhart substation) on the Beta site, and a series of drainage channels. Additional details describing the construction elements for the solar facility can be found in the biological assessment (AECOM 2010).

Operation and Maintenance of Mojave Solar Facility

The biological assessment states that the Mojave Solar facility has operating life of 32.25 years to include operation and construction. During operation and maintenance, facility workers would travel Harper Lake Road to access the project site. Operation and maintenance activities for the solar facility would be conducted within the fenced solar facility. However, in the event that the perimeter fence needed repair (including clearing vegetation from the fenced drainage channel), fence repair work could require vehicles and equipment to work outside the Mojave Solar facility fencing.

Decommissioning and Restoration of Mojave Solar Facility

Prior to decommissioning, Abengoa would develop a decommissioning plan specifying how closure procedures would be developed and implemented. Project decommissioning would be performed in accordance with all other plans, permits, and mitigation measures that would assure the project conforms to applicable requirements and would avoid significant adverse impacts. (CEC 2010b). At that time, if a Federal agency is involved with decommissioning, it would determine if decommissioning requires additional consultation, pursuant to section 7(a)(2) of the Endangered Species Act. If a Federal agency would not be involved with decommissioning and desert tortoises were likely to be killed by associated activities, we would recommend that Abengoa (or the current operator) apply for a permit under the authorities of section 10(a)(1)(B) of the Act. Consequently, we will not analyze the potential effects of decommissioning and associated restoration on the desert tortoise at this time.

Installation, Maintenance, and Operation of Fiber Optic Lines

To allow for the installation of the fiber optic lines, the Bureau would modify four existing right-of-way grants and establish one new grant.

Generally, the fiber optic lines would be installed on existing poles. Replacement poles would be accessed from existing roads or previously disturbed areas and would result in 4,500 square feet of disturbance per pole. Pulling and splice sites to install the lines would result in 4,800 square feet of disturbance per site and installation of fiber optic cable hardware would result in 280 square feet of disturbance. Additional details describing the installation of the fiber optic lines can be found in the biological assessment (AECOM 2010). The following table provides information on the fiber optic lines.

The following table summarizes the construction activities that would occur along each route and the amount of desert tortoise habitat that would be affected. Because SCE does not know the precise location of the disturbance associated with placement of the poles, the potentially affected area represents a maximum estimate.

Route	Feature	Impact (acres)
Lockhart to Tortilla 31 miles (3 right-of-way grants)	3 replacement poles (accessed from existing roads or other previously disturbed areas)	0.315
	access road - 8 feet wide by 6,100 feet long (through recovering vegetation)	1.12
	access road - 8 feet wide by 5 miles long (through recovering vegetation)	4.855
	32 pulling and splicing sites	3.53
	segments in underground conduits – 2; 400 feet at Harper Lake Road and 500 feet west of Tortilla substation	
Subtotal		9.81
Lockhart to Kramer 16.39 miles	4 replacement poles (accessed from existing disturbed areas)	0.41
	13 pulling and splicing sites	1.43
	Subtotal	1.84
Kramer to Victor 37.98 miles	30 new poles between existing poles	7.75
	201 installation sites – fiber optic cable hardware onto poles	1.29
	22 pulling and splicing sites	2.42
Subtotal		11.46
TOTAL		23.11

In 1995, the Service issued a biological opinion to SCE that addressed the effects of the operation and maintenance of its transmission and distribution lines in the California desert (Service 1995a). The effects of operating and maintaining the proposed fiber optic lines would be the same as those analyzed in the 1995 biological opinion. Therefore, we will not discuss these activities and their effects any further in this biological opinion.

Minimization Measures

General Protective Measures

To minimize adverse effects to the desert tortoise, Abengoa and SCE will implement the following protective measures during construction, operation, and maintenance activities. We have changed the wording of some measures identified in the biological assessment and translocation plan, but we have not changed the substance of the measures that Abengoa and SCE have proposed.

1. Abengoa and SCE will assign a designated biologist to the project that meets the criteria of a desert tortoise authorized biologist as described by the Service. (Throughout this biological opinion, 'authorized biologist' refers to an authorized biologist with regard to the desert tortoise.)
2. Abengoa and SCE will employ authorized biologists, approved by the Bureau, Service, CEC and California Department of Fish and Game (CDFG), and desert tortoise monitors to ensure compliance with protective measures for the desert tortoise. Use of authorized biologists and desert tortoise monitors will be in accordance with the most up-to-date Service guidance and will be required for monitoring of any construction, operation, or maintenance activities that may result in adverse effects to the desert tortoise. The current guidance is entitled *Desert Tortoise – Authorized Biologist and Monitor Responsibilities and Qualifications* (Service 2008a).
3. Abengoa and SCE will provide the credentials of all individuals seeking approval as authorized biologists to the DOE, Bureau, Service, CEC and CDFG. (A qualifications statement for authorized biologists and an authorized biologist request form are located on our website (http://www.fws.gov/ventura/speciesinfo/protocols_guidelines/); please use these forms to fully understand the qualifications we are seeking for authorized biologists and to request our approval of these biologists.)
4. Abengoa and SCE will use authorized biologists for the performance of clearance surveys and for any other activities that require the handling of desert tortoises. If Abengoa uses desert tortoise monitors during clearance surveys or for other activities that require identification of sign or handling of desert tortoises, they will do so under the direct supervision of an authorized biologist.
5. Abengoa and SCE will designate a field contact representative who will oversee compliance with protective measures during construction, operation, and maintenance activities that may result in injury or mortality of desert tortoises. If the field contact representative, authorized biologist, or desert tortoise monitor identifies a violation of the desert tortoise protective measures, they will halt work until the violation is corrected.

6. Abengoa and SCE will develop and implement a worker environmental awareness program. The worker environmental awareness program will be administered to all project employees, as well as employees of contractors and subcontractors, who work on the project site or any related facilities during site mobilization, ground disturbance, grading, construction, operation, and closure. The worker environmental awareness program will include, but is not limited to, the following:
 - a) a presentation in which supporting written material and electronic media are made available to all participants;
 - b) a discussion of the locations and types of sensitive biological resources on the project site and adjacent areas;
 - c) a discussion of penalties for violation of applicable laws, ordinances, regulations, and standards (i.e., Federal and State Endangered Species Acts); and
 - d) identification of a contact if workers have further comments and questions about the material discussed in the program.
7. Abengoa and SCE will develop and implement a Biological Resources Mitigation Implementation and Monitoring Plan and submit copies of the proposed plan to the Service, Bureau and CDFG for review and comment. A copy of the Biological Resources Mitigation Implementation and Monitoring Plan will be kept on site and made readily available to biologists, regulatory agencies, the project owner, contractors, and subcontractors, as needed. The plan will identify:
 - a) All biological resource mitigation, monitoring, and compliance measures proposed and agreed to by the project owner;
 - b) All biological resource conditions of certification identified as necessary to avoid or mitigate impacts;
 - c) All biological resource mitigation, monitoring, and compliance measures required in Federal agency terms and conditions, such as those provided in the biological opinion;
 - d) All biological resource mitigation, monitoring, and compliance measures required in local agency permits, such as site grading and landscaping requirements;
 - e) All sensitive biological resources to be affected, avoided, or mitigated by project construction, operation, and closure;

- f) All required mitigation measures for each sensitive biological resource;
 - g) All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction; and
 - h) Duration for each type of monitoring and a description of monitoring methodologies and frequency.
- 8. Abengoa and SCE will ensure that the boundaries of all areas to be temporarily or permanently disturbed (including staging areas, access roads, and sites for temporary placement of spoils) will be delineated with stakes and flagging prior to construction activities in consultation with the designated biologist. Spoils will be stockpiled in disturbed areas, which do not provide habitat for special-status species. Parking areas, staging and disposal site locations will similarly be located in areas without native vegetation or special-status species habitat. All disturbances, vehicles, and equipment will be confined to the flagged areas.
- 9. Abengoa and SCE will not extend any new and existing roads planned for construction, widening, or other improvements outside the flagged impact area. All vehicles passing or turning around will do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads (e.g., new spur roads) or the construction zone, the route will be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.
- 10. Abengoa and SCE will confine vehicular traffic during project construction and operation to existing routes of travel to and from the project site and cross-country vehicle and equipment use outside designated work areas will be prohibited. The speed limit will not exceed 25 miles per hour on Harper Lake Road and within fenced areas that have been cleared of desert tortoises and other wildlife. The speed limit will be 15 miles per hour within unfenced areas and secondary unpaved access roads.
- 11. During construction, Abengoa and SCE will ensure that an authorized biologist is present during all activities that have the potential to disturb soil, vegetation, and wildlife. The authorized biologist will closely monitor vegetation removal and grading activities to prevent injury or mortality of desert tortoises.
- 12. Abengoa will use staging areas for construction on the solar facility site within the area that has been previously cleared of desert tortoises and fenced to exclude desert tortoises. Temporary disturbance areas, if necessary, will occur within the solar facility site and will be designed, installed, and maintained with the goal of minimizing disturbance.
- 13. Abengoa and SCE will use road surfacing and sealants and soil bonding and weighting agents that are not toxic to wildlife and plants on unpaved surfaces.

14. Facility lighting will be designed, installed, and maintained to prevent side casting of light toward the solar facility boundaries and the Harper Dry Lake marsh. Lighting will be shielded, directional, and at the lowest intensity required for activity.
15. Parking and storage will occur within desert tortoise exclusion fencing to the extent feasible. No vehicles or construction equipment parked outside the fenced area will be moved prior to an inspection of the ground beneath the vehicle for the presence of desert tortoises.
16. During construction, an authorized biologist will drive along project access roads, particularly Harper Lake Road, at least every 3 hours during the active period (April through May and September through October) looking for desert tortoises or other vulnerable wildlife within the roadway. Outside of the active period, roads will be monitored at least twice a day in advance of peak morning and evening traffic periods. During operation, employees will report any desert tortoise sightings along roadways to the authorized biologist. If a desert tortoise is observed in the roadway or beneath a parked vehicle, it will be left to move on its own or an authorized biologist may remove and transfer the animal to a safe location as identified in the translocation plan (Karl 2011).
17. During construction, at the end of each workday, all potential desert tortoise pitfalls (trenches, bores, and other excavations) outside the permanently fenced area will be backfilled. If backfilling is not feasible, all trenches, bores, and other excavations will be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, covered completely to prevent wildlife access, or fully enclosed with temporary desert tortoise exclusion fencing. All trenches, bores, and other excavations outside the areas permanently fenced with desert tortoise exclusion fencing will be inspected at the beginning of each day, periodically throughout, and at the end of each workday by authorized biologist. If a desert tortoise is found trapped, an authorized biologist will remove and relocate it to a safe location.
18. Abengoa and SCE will inspect any construction pipe, culvert, or similar structure with a diameter greater than 3 inches, stored less than 8 inches above the ground for one or more days/nights for wildlife before the material is moved, buried, or capped. As an alternative, all such structures may be capped before being stored or placed on pipe racks.
19. Abengoa and SCE will ensure that all inadvertent deaths of sensitive species are reported to the appropriate project representative, including road kill. Species name, physical characteristics of the animal (sex, age class, length, weight), and other pertinent information will be noted and reported in the monthly compliance reports. Injured animals will be reported to the Service, CDFG, and Bureau (when applicable) and the project owner will follow instructions provided by the wildlife agencies. If the wildlife agencies cannot be immediately reached, consideration will be given to taking the animal to a veterinary hospital.

20. Abengoa and SCE will prevent the formation of puddles when applying water to dirt roads and construction areas (trenches or spoil piles) for dust abatement. A monitor will patrol these areas to ensure water does not puddle and attract desert tortoises, common ravens (*Corvus corax*), and other wildlife to the site and will take appropriate action to reduce water application where necessary.
21. All vehicles and/or equipment will be maintained in good working condition and will be repaired if there is evidence of leaking motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The project hazardous materials plan will address proper procedures in the event of spills. Hazardous spills will be immediately cleaned up and will be disposed of at an authorized facility. Servicing of construction equipment will take place only at a designated area. Service/maintenance vehicles will carry a bucket and pads to absorb leaks and spills.
22. With the exception of security personnel, Abengoa and SCE will prohibit firearms on the project site.
23. If ground-disturbing activities are required prior to site mobilization, such as for geotechnical borings or hazardous waste evaluations, an authorized biologist will be present to monitor any action that could disturb soil, vegetation, or wildlife.
24. Prior to any ground-disturbing activities on the solar facility site, Abengoa will fence the area with desert tortoise exclusion fence, either temporary or permanent, and conduct clearance surveys following Service guidelines (2009a). The exclusion fencing will follow the specifications provided in the *Desert Tortoise Field Manual* (Service 2009a). We have provided a description of the procedures for clearance, translocation, and monitoring of these animals below. Workers will perform all ground-disturbing activities in areas fenced with exclusion fence on the solar facility site.
25. To avoid impacts to desert tortoises during fence construction, the proposed fence alignment will be flagged and the alignment surveyed within 24 hours prior to fence construction. Surveys will be conducted by an authorized biologist and will provide 100 percent coverage of all areas to be disturbed during fence construction; additional transects will be surveyed along both sides of the proposed fence line. These fence line transects will cover an area approximately 90 feet wide centered on the fence alignment using 15-foot-wide transects. All desert tortoise burrows and burrows constructed by other species that might be used by desert tortoises will be examined to assess occupancy of each burrow by desert tortoises and processed in accordance with the Service's current guidelines (Service 2009a).
26. Abengoa will install desert tortoise exclusion fencing at the headwalls, outlet, and road crossings of the onsite storm water drainage channels.

27. Security gates will be installed at the solar facility entrances and Abengoa will ensure that the gates remain closed except when vehicles enter or exit the facility. The gates will be designed with minimal ground clearance to deter ingress by desert tortoises. The gates may be electronically activated to open and close immediately after vehicle(s) have entered or exited to prevent extended periods with open gates, which might lead to a desert tortoise entering.
28. Following installation of the desert tortoise exclusion fencing for the solar facility site and storm water drainage channels, the fencing will be regularly inspected. Permanent fencing will be inspected monthly and during or immediately following all major rainfall events. Any damage to the fencing will be temporarily repaired immediately to keep desert tortoises out of the site and permanently repaired within 2 days of observing damage. Inspections of permanent site fencing will occur for the life of the solar facility. Temporary fencing will be inspected immediately following major rainfall events. All temporary fencing will be repaired immediately upon discovery and, if the fence may have permitted entry of desert tortoises while damaged, an authorized biologist will inspect the area enclosed by the fence for desert tortoises. A major rainfall event is defined as one for which soil and water flow through washes or overland that could damage the fence or erode the soil underneath.

Management of Common Ravens

Abengoa and SCE will implement the following project design features and protective measures to reduce the adverse effects associated with predation of desert tortoises by common ravens. The draft management plan for common ravens (AECOM 2009) contains more detailed information on the following actions related to Abengoa's solar facility.

1. Abengoa and SCE will dispose of all trash and food-related waste associated with the project in secure, self-closing receptacles to prevent the introduction of subsidized food resources for common ravens.
2. Abengoa will remove and dispose of all road-killed animals on the project site or its access roads.
3. Abengoa will use water for construction, operation, and maintenance (e.g., truck washing, dust suppression, landscaping, etc.) in a manner that does not result in puddling.
4. Abengoa will monitor the evaporation ponds on site for common raven use according to the approved Abengoa solar evaporation pond design monitoring and management plan and common raven management plan.
5. Abengoa will monitor the Mojave Solar facility to identify frequently used perching locations for common ravens. If it identifies such locations, Abengoa will use physical, auditory or visual bird deterrents to discourage use by common ravens.

6. Abengoa will conduct annual breeding season monitoring for common ravens to identify any nesting common ravens on the project facility for the life of the project.
7. Abengoa will remove inactive common raven nests from project structures on lands controlled by Abengoa. SCE will address common raven nests according to its existing migratory bird special purpose permit (MB728480-1, expires 3/31/2012).
8. Abengoa will notify the Service within 24 hours if problem common ravens are found on the project site. Problem common ravens are individuals that have been shown, through monitoring, to prey on desert tortoises.
9. Abengoa will monitor the effectiveness of its management plan at reducing subsidies for common ravens during construction and for 2 years following completion of the project. After this initial period, Abengoa will conduct monitoring once every 5 years, unless results indicate more or less frequent monitoring is necessary.
10. Abengoa will develop and implement adaptive management measures if monitoring shows that the management plan is not effective in controlling common raven use of the project site. Abengoa will consult with the Service, CEC, and CDFG prior to implementing adaptive management changes.

To address indirect and cumulative effects that it cannot fully eliminate through implementation of an onsite common raven management plan, Abengoa and SCE will contribute \$105 per acre of land permanently disturbed by this project to the regional common raven management program. The funds will be placed in an account established with the National Fish and Wildlife Foundation to implement recommendations in the Service's (2008b) environmental assessment for management of common ravens. This environmental assessment identifies several activities to reduce common raven predation on desert tortoises, including reduction of human-provided subsidies (e.g., food, water, sheltering and nesting sites), education and outreach, the removal of common ravens and their nests, evaluation of effectiveness, and adaptive management.

Weed Management

Abengoa and SCE will implement the following measures during construction and operation to prevent the spread and propagation of noxious weeds.

1. Abengoa and SCE will limit the size of any vegetation and ground disturbance to the absolute minimum and limit ingress and egress to defined routes.
2. Abengoa and SCE will apply soil stabilization and/or re-vegetation treatments as appropriate to disturbed sites and temporarily disturbed areas.
3. During all construction activities, Abengoa and SCE will prevent the spread of non-native plants via vehicular sources by implementing Trackclean™ (a tire cleaner

designed to dislodge material from tire treads) or other methods of vehicle cleaning for vehicles coming and going from construction sites. Earth-moving equipment and construction vehicles will be cleaned within an approved area or commercial facility prior to transport to the construction site. The number of cleaning stations will be limited and weed control and herbicide application will be used at the cleaning station(s).

4. Abengoa and SCE will use only weed-free straw, hay bales, and seed, or other similar items, for erosion control and sediment barrier installations.
5. Abengoa and SCE will ensure that invasive non-native species are not used in landscaping plans and erosion control.
6. Abengoa and SCE will monitor and implement control measures to ensure early detection and eradication of weed invasions.

Protective Measures Specific to the SCE Fiber Optic Line Installation

In addition to general measures outlined previously in this biological opinion, all personnel involved in the construction of the fiber optic cable installations will adhere to the following measures.

1. SCE will use Service-approved authorized biologists to conduct preconstruction clearance surveys for desert tortoises within the limits of the proposed work activity associated with the fiber optic cable installations.
2. Vehicular traffic during construction will be confined to existing routes of travel to and from the project site, and cross-country vehicle and equipment use outside designated work areas will be prohibited. Where new access is required outside of existing roads (e.g., new spur roads) or the construction zone, the route will be clearly marked (i.e., flagged and/or staked) prior to the onset of construction. The speed limit will be 15 miles per hour within unfenced areas and secondary unpaved access roads. Personnel will check under parked vehicles prior to moving the vehicle. If a desert tortoise is found under a vehicle and does not leave on its own, an authorized biologist can be called to move the animal out of harm's way, no more than 500 meters from its original location.

(Throughout this biological opinion, "moving desert tortoises from harm's way" refers to moving the desert tortoise the minimum distance necessary to place it in a safe location, within its home range. Moving desert tortoise from harm's way will only occur on linear portions of the project. All other movements involve translocation of desert tortoises; these movements will only occur with desert tortoises found within the solar facility site.)

3. In construction areas in potentially occupied desert tortoise habitat, work and staging areas, including the locations of the fiber optic lines under construction, may be fenced with Service-approved temporary desert tortoise exclusion fencing in a manner that

prevents equipment and vehicles from straying from the designated work area into adjacent habitat. An authorized biologist will assist in determining the boundaries of the area to be fenced in consultation with the Service and CDFG, and with the Bureau when construction areas are within lands administered by the Bureau.

4. An authorized biologist will be onsite to address any desert tortoises found inside fenced areas that are not fully graded. When active construction occurs outside of desert tortoise exclusion fencing, monitoring will be continuous.
5. All workers will be advised that equipment and vehicles must remain within the fenced work areas. Installation of the fencing and any necessary surveys will be directed or conducted by an authorized biologist. The fencing will remain in place for the duration of construction activities at a particular location and will be removed when construction activities are complete.
6. A desert tortoise authorized biologist will inspect the fencing on a biweekly basis to ensure that no holes develop that could allow desert tortoises to enter the work areas. If holes are found, they will be repaired immediately.
7. If a desert tortoise is found within an area that has been fenced to exclude them, activities will cease until an authorized biologist moves it out of harm's way outside of the fence, no greater than 500 meters away from its original location. At this time, the fencing will be inspected for holes.
8. If a desert tortoise is found in a construction area where fencing was deemed unnecessary, it will be moved in the manner described in the translocation plan (Karl 2011). Any desert tortoises found during clearance surveys will be moved in the manner identified in the translocation plan (Karl 2011).
9. Authorized biologists will follow the Service's current desert tortoise handling guidelines at all times (currently Service 2009a).
10. SCE will restrict work to daylight hours, except during an emergency, to avoid nighttime activities when desert tortoises may be present on the access road unless otherwise approved in advance by the Bureau and CDFG.
11. SCE will only use seed from locally occurring species when rehabilitating and restoring temporarily disturbed areas. Seeds will contain a mix of short-lived early pioneer species, such as native annuals and perennials and subshrubs. Seeding will be conducted as described in chapter 5 of Newton and Claassen (2003).

*Desert Tortoise Translocation*Fencing Surveys Mojave Facility

Abengoa will install desert tortoise exclusion fencing following specifications in the *Desert Tortoise Field Manual* (Service 2009a) prior to any construction activities on the solar facility site. The permanent fence around the solar facility will also include the drainage channel. The desert tortoise exclusion fence will be attached to the Mojave Solar facility permanent perimeter fence. Temporary fencing may be used to exclude desert tortoises until the permanent fence is installed. Temporary fencing will follow guidelines and materials for permanent fencing except in very temporary situations, when silt fencing may be used. In both cases, supporting stakes will be sufficiently spaced (e.g., ≤ 8 feet for wire mesh; ≤ 5 feet for silt fencing) to maintain fence integrity. Fencing may be buried if it would not create a biologically significant disturbance or bent outward at the ground level with the bent portion tacked or held down by rocks and soil.

Within 24 hours prior to fence installation, authorized biologists will survey the staked fence-line for all desert tortoises and their burrows, covering a swath of at least 90 feet centered on the fence-line, using 15-foot-wide transects. Desert tortoise burrows will be flagged and mapped using Global Positioning System and the size and occupancy recorded. If possible, burrows will be avoided. Unoccupied burrows that cannot be avoided will be collapsed following standardized techniques (Service 2009a). If the burrow is occupied by a desert tortoise, it will be avoided and the burrow fenced with high visibility fencing. The burrow and fence will be continually monitored while construction proceeds in the immediate area of the burrow and once all danger of construction has passed, the fencing will be removed.

At a minimum, one desert tortoise monitor will accompany each separate fence construction team, such that no driving, trenching, fence pulling, or any surface disturbing activities will occur without the immediate presence of a desert tortoise monitor. Maps of burrows from the preconstruction survey will be provided to all monitors.

During fence construction, desert tortoises will be avoided if at all possible. Fence gaps and temporary fencing will be used to allow desert tortoises to leave the project site. Any desert tortoises that must be moved during perimeter fencing will be fitted with a transmitter and moved immediately outside the construction zone, following the procedures outlined in Abengoa's translocation plan (Karl 2011).

Following installation of the desert tortoise exclusion fencing, both permanent and temporary, the fencing will be regularly inspected. If the exclusion fence is installed during the desert tortoise active season, the fencing will be inspected at least two times a day to determine if any desert tortoises are walking along the inside of the fence.

Abengoa will conduct a minimum of three clearance surveys of the Mojave Solar facility site following Service guidelines (2009a). Abengoa will consider the solar facility site cleared of desert tortoises when no desert tortoises are located during two consecutive clearance passes. If

a desert tortoise is found on one of the final passes, Abengoa will continue to conduct clearance surveys until two passes have been made during which no new desert tortoises are found.

Abengoa will map and evaluate all desert tortoise sign during each clearance pass and collect all scat located. During subsequent passes, Abengoa will conduct concentrated searches in areas where fresh scat is found. After the second pass, concentrated searches will be conducted in all areas where recent sign is concentrated, unless a desert tortoise has been found in that area.

Abengoa will not collapse burrows until the third pass of clearance surveys. On the third pass, Abengoa will completely excavate burrows using standardized techniques approved by the Service (2009a). Abengoa will translocate any desert tortoise nests found during burrow excavation in the manner outlined in the translocation plan (Karl 2011).

Translocation – Mojave Solar Facility

Abengoa will follow the procedures outlined in the translocation plan for the proposed project (Karl 2011). An authorized biologist will move all desert tortoises found during clearance surveys safely from the solar facility site.

All desert tortoises determined to be appropriate for translocation (i.e., having good body condition and showing no sign of diseases such as upper respiratory tract disease, herpes virus, shell disease, or other diseases) will be marked with a unique identifier determined by the Desert Tortoise Recovery Office and released in a safe location underneath a shrub. If desert tortoises show signs of disease, they will be sent to the Desert Tortoise Conservation Center after coordinating with the Service. Prior to translocation, Abengoa will ensure that all desert tortoises receive a visual health assessment to verify that each individual does not show signs of disease. Desert tortoises translocated a distance greater than 500 meters will be tested for disease (i.e., enzyme-linked immunosorbent assay [ELISA] test) via blood sampling. Any desert tortoises moved less than 500 meters will not require a blood sample as part of the health assessment. Abengoa will not translocate desert tortoises outside of the recommended temperature guidelines or outside of the desert tortoise active season (generally between April 1 and May 31). Abengoa will maintain a record of all desert tortoises encountered and translocated during project surveys and monitoring.

All desert tortoises translocated from the Mojave Solar facility site will be measured, weighed, and affixed with a transmitter at the time of initial capture. Following processing, if the subadult or adult desert tortoise is within 500 meters of suitable desert tortoise habitat outside of the solar facility boundary, Abengoa will place the individual in the shade of a shrub or at the mouth of a burrow and begin monitoring as described below. Subadult and adult desert tortoises that are found greater than 500 meters from suitable desert tortoise habitat outside of the solar facility site will be released at the capture site after being processed and fitted with a transmitter. Abengoa will monitor these desert tortoises daily for one week to determine if the desert tortoise moves to an area within 500 meters of suitable habitat outside of the project boundary, indicating an area with which the desert tortoise is familiar. If the desert tortoise demonstrates familiarity

(e.g., burrows, fence walks, or spends the majority of their time) with an area within 500 meters of suitable desert tortoise habitat outside of the solar facility boundary, Abengoa will translocate the desert tortoise as described above. If, during the week of monitoring, the desert tortoise remains greater than 500 meters from suitable desert tortoise habitat outside the solar facility boundary, the desert tortoise will be placed in an individual quarantine pen within the translocation area.

Abengoa will translocate juvenile desert tortoises (carapace length less than 110 millimeters) found within 100 meters of suitable desert tortoise habitat outside the solar facility boundary, in the same manner as subadult and adult desert tortoises found within 500 meters of suitable habitat. Juvenile desert tortoises found greater than 100 meters from suitable desert tortoise habitat outside the solar facility boundary will be moved into predator-proof enclosures described in the translocation plan (Karl 2011). After 2 weeks, Abengoa will create escape holes at the lower edge of the enclosures and the juvenile desert tortoises will be allowed to leave on their own.

To minimize the potential adverse effects of disease, Abengoa will perform visual health assessments on all desert tortoises located within 1.5 kilometers of a desert tortoise translocated less than 500 meters; Abengoa will perform visual health assessments and ELISA testing on all desert tortoises located within 6.5 kilometers of a desert tortoise translocated greater than 500 meters. Desert tortoises in the recipient areas receiving ELISA testing will be fitted with a transmitter so that the individuals can be identified and relocated after test results are received. Following the determination of the individual's health, the transmitter will be removed. Abengoa will not translocate any desert tortoises from the project site to a location within 1.5 and 6.5 kilometers (for translocations less than and greater than 500 meters, respectively) of a resident desert tortoise showing either clinical signs of disease or with a blood test result indicating that the individual is seropositive.

Monitoring - Mojave Solar Facility

Abengoa will attach transmitters to and monitor all desert tortoises cleared from the Mojave Solar facility site that are of sufficient size to accommodate transmitters. Smaller animals (i.e., those that do not receive transmitters) will be blood tested (when being moved greater than 500 meters) and translocated without transmitters if found to be in good health. Abengoa will collect blood samples on the resident subadults and adults located in the recipient areas receiving desert tortoises from more than 500 meters away. If five or more desert tortoises are found within the Mojave Solar facility site, Abengoa will work with the Service, CEC, CDFG, and Bureau to determine appropriate resident and control animals for monitoring. (We will not consider the potential effects of these activities on resident and control animals in this biological opinion; if more than four desert tortoises are found on the proposed solar site, re-initiation of formal consultation would likely be appropriate.) Abengoa will use qualified biologists, authorized by the Service, CEC, and CDFG, to monitor all desert tortoises associated with the project translocation plan.

During monitoring, Abengoa will collect information on survivorship, mortality rates, health status, body condition, movement of individuals, and predation to inform adaptive management. Abengoa will monitor the translocated for a minimum of 5 years, unless a shorter duration is approved by the Service. Abengoa has provided a more detailed description of the monitoring program in its translocation plan (Karl 2011). Following more intensive monitoring immediately after translocation, locations for individuals will be collected at a minimum of once per week from March to November and once every other week from November to February.

Translocation - SCE Fiber Optic Lines

SCE will not translocate any desert tortoises in association with the installation of the fiber optic lines. SCE will move from harm's way any desert tortoises found within the construction area. SCE will place desert tortoises as close as possible to the capture point immediately outside the construction zone under the shade of a shrub in suitable desert tortoise habitat. SCE will not move desert tortoises more than 500 meters. SCE will use qualified biologists, authorized by the Service, Bureau, and CDFG to handle any desert tortoises that must be moved from harm's way during the installation of the fiber optic lines.

Mojave Solar Project Minimization Measures

To minimize adverse effects to the desert tortoises, Abengoa and SCE will implement the following protective measures when implementing clearance surveys, translocation, and monitoring:

1. Abengoa will use authorized biologists with additional qualifications approved by the Service for attaching transmitters and collecting blood samples.
2. Following clearance of the fenced solar facility, an authorized biologist will be onsite during initial clearing and grading to move any desert tortoises missed during the clearance surveys. Following initial clearing and grading, an authorized biologist will be on-call during construction, should a desert tortoise be located inside the project construction site.
3. An authorized biologist will hydrate all desert tortoises scheduled for translocation within 12 hours prior to release in accordance with the translocation plan.
4. Abengoa will only use Service-authorized individuals that have experience identifying the clinical signs of upper respiratory tract disease, herpes virus, and cutaneous dyskeratosis for the performance of health assessments. Abengoa will provide the Service with the qualifications of any authorized biologists that it will use to perform health assessments on desert tortoises during clearance and translocation activities.
5. The number of desert tortoises translocated into translocation areas greater than 500 meters will not exceed the Service-recommended (2010b) 130 percent over the mean

density of desert tortoises in the Western Mojave Recovery Unit, as determined by line-distance sampling.

Compensation

Abengoa will provide approximately 118.2 and 88.6 acres of desert tortoise habitat to compensate for impacts associated with the construction of Mojave Solar facility site and the installation of the fiber optics lines, respectively. The actual acres of compensation associated with the installation of the fiber optic lines will be determined following the completion of the project, and will be based on the actual amount of acres disturbed. The lands will be preserved and managed in perpetuity for the benefit of the desert tortoise, pursuant to a conservation easement to be deeded to CDFG or to a third-party entity (such as the Bureau) approved by CDFG and CEC. The Bureau, CDFG, and CEC are working with Abengoa to identify the compensation lands and the total amount of desert tortoise habitat that will be preserved. The acquisition of these lands will promote the conservation of the desert tortoise to a minor degree; we will not discuss compensation further in this biological opinion.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATION

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of the species (50 Code of Federal Regulations 402.02).

The jeopardy analysis in this biological opinion relies on four components: (1) the Status of the Species, which describes the range-wide condition of the desert tortoise, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which analyzes the condition of the desert tortoise in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the desert tortoise; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the desert tortoise; and (4) the Cumulative Effects, which evaluates the effects on the desert tortoise of future, non-Federal activities in the action area.

In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the current status of the desert tortoise, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the desert tortoise in the wild. The jeopardy analysis in this biological opinion places an emphasis on consideration of the range-wide survival and recovery needs of the desert tortoise and the role of the action area in the survival and recovery of the desert tortoise as the

context for evaluation of the significance of the effects of the proposed federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF THE DESERT TORTOISE

Basic Ecology

The desert tortoise is a large, herbivorous reptile found in portions of the California, Arizona, Nevada, and Utah deserts. It also occurs in Sonora and Sinaloa, Mexico. In California, the desert tortoise occurs primarily within the creosote (*Larrea tridentata*), shadscale (*Atriplex confertifolia*), and Joshua tree (*Yucca brevifolia*) series of Mojave Desert scrub, and the Lower Colorado River Valley subdivision of Sonoran Desert scrub. Optimal habitat has been characterized as creosote bush scrub in areas where precipitation ranges from 2 to 8 inches, diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner and Brown 1982, Schamberger and Turner 1986). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. In California, desert tortoises are typically associated with gravelly flats or sandy soils with some clay, but are occasionally occur in windblown sand or in rocky terrain (Luckenbach 1982). Desert tortoises occur in the California desert from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 feet to 3,000 feet (Luckenbach 1982, Schamberger and Turner 1986). Recent range-wide monitoring efforts have consistently documented desert tortoises above 3,000 feet (Service 2006a).

Desert tortoises may spend more time in washes than in flat areas outside of washes. Jennings (1997) notes that, between 1 March and 30 April, desert tortoises “spent a disproportionately longer time within hill and washlet strata” and, from 1 May through 31 May, hills, washlets, and washes “continued to be important.” Jennings’ paper does not differentiate between the time desert tortoises spent in hilly areas versus washes and washlets; however, he notes that, although washes and washlets comprised only 10.3 percent of the study area, more than 25 percent of the plant species on which desert tortoises fed were located in these areas. Luckenbach (1982) states that the “banks and berms of washes are preferred places for burrows.” He also recounts an incident in which a flash flood killed 15 desert tortoises along 0.12 miles of wash.

Desert tortoises are most active in California during the spring and early summer when annual plants are most common; because their behavior depends on numerous factors, such as temperatures, rainfall, and the size of the animal, we cannot provide definitive dates for when desert tortoises are likely to be active. Additional activity occurs during warmer fall months and occasionally after summer rainstorms. Desert tortoises spend most of their time during the remainder of the year in burrows, escaping the extreme conditions of the desert; however, recent work has demonstrated that they can be active at any time of the year. Further information on the range, biology, and ecology of the desert tortoise can be found in Burge (1978), Burge and Bradley (1976), Hovik and Hardenbrook (1989), Luckenbach (1982), Weinstein et al. (1987), and Service (1994).

Food resources for desert tortoises are dependent on the availability and nutritional quality of annual and perennial vegetation, that climatic factors, such as the timing and amount of rainfall, temperatures, and wind may influence (Beatley 1969 and 1974, Congdon 1989, Karasov 1989, Polis 1991 (all in Avery 1998)). In the Mojave Desert, these climatic factors are highly variable and this variability can limit the desert tortoise's food resources.

Desert tortoises will eat many species of plants. However, at any time, most of their diet consists of a few species (Nagy and Medica 1986, Jennings 1993 (all in Avery 1998)). Additionally, their preferences can change during the course of a season (Avery 1998) and over several seasons (Esque 1994 in Avery 1998). Possible reasons for desert tortoises to alter their preferences may include changes in nutrient concentrations in plant species, the availability of plants, and the nutrient requirements of individual animals (Avery 1998). In Avery's (1998) study in the Ivanpah Valley, desert tortoises consumed primarily green annual plants in spring and they ate cacti and herbaceous perennials once the winter annuals began to disappear. Medica et al. (1982 in Avery 1998) found that desert tortoises ate increased amounts of green perennial grass when winter annuals were sparse or unavailable. Avery (1998) also found that desert tortoises rarely ate perennial grasses.

Desert tortoises can produce from one to three clutches of eggs per year. On rare occasions, clutches can contain up to 15 eggs. Most clutches contain three to seven eggs. Multi-decade studies of the Blanding's turtle (*Emydoidea blandingii*), that, like the desert tortoise, is long lived and matures late, indicate that approximately 70 percent of the young animals must survive each year until they reach adult size. After this time, annual survivorship exceeds 90 percent (Congdon et al. 1993). Research has indicated that 50 to 60 percent of young desert tortoises typically survive from year to year, even in the first and most vulnerable year of life. We do not have sufficient information on the demography of the desert tortoise to determine whether this rate is sufficient to maintain viable populations; however, it does indicate that maintaining favorable habitat conditions for small desert tortoises is crucial for the continued viability of the species.

Desert tortoises typically hatch from late August through early October. At the time of hatching, the desert tortoise has a substantial yolk sac. The yolk can sustain them through the fall and winter months until forage is available in the late winter or early spring; however, neonates will eat if food is available to them at the time of hatching. When food is available, they can reduce their reliance on the yolk sac to conserve this source of nutrition. Neonate desert tortoises use abandoned rodent burrows for daily and winter shelter. These burrows are often shallowly excavated and run parallel to the surface of the ground.

Neonate desert tortoises emerge from their winter burrows as early as late-January to take advantage of freshly germinating annual plants. If appropriate temperatures and rainfall are present, at least some plants will continue to germinate later in the spring. Freshly germinating plants and plant species that remain small throughout their phenological development are important to neonate desert tortoises because their size prohibits access to taller plants. As plants grow taller during the spring, some species become inaccessible to small desert tortoises.

Neonate and juvenile desert tortoises require approximately 12 to 16 percent protein content in their diet for proper growth. Both juvenile and adult desert tortoises seem to forage selectively for particular species of plants with favorable ratios of water, nitrogen (protein), and potassium. The potassium excretion potential model (Ofstedal 2001) predicts that, at favorable ratios, the water and nitrogen allow desert tortoises to excrete high concentrations of potentially toxic potassium, which is abundant in many desert plants. Ofstedal (2001) also reports that variation in rainfall and temperatures cause the potassium excretion potential index to change annually and during the course of a plant's growing season. Therefore, the changing nutritive quality of plants, combined with their increase in size, further limits the forage available to small desert tortoises to sustain their survival and growth.

In summary, the ecological requirements and behavior of neonate and juvenile desert tortoises are substantially different from those of subadults and adults. Smaller desert tortoises use abandoned rodent burrows, which are typically more fragile than the larger ones constructed by adults, they are active earlier in the season, and small desert tortoises rely on smaller annual plants with greater protein content. The smaller plant size allows them to gain access to food and the higher protein content promotes growth.

Recovery Plan

The recovery plan for the desert tortoise is the basis and key strategy for recovery and delisting of the desert tortoise. The recovery plan divides the range of the desert tortoise into 6 distinct population segments, or recovery units, and recommends the establishment of 14 desert wildlife management areas throughout the recovery units. Within each desert wildlife management area, the recovery plan recommends implementation of reserve level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The recovery plan also recommends that desert wildlife management areas be designed to follow the accepted concepts of reserve design and be managed to restrict human activities that negatively affect desert tortoises (Service 1994). The delisting criteria established by the recovery plan are:

1. The population within a recovery unit must exhibit a statistically significant upward trend or remain stationary for at least 25 years;
2. Enough habitat must be protected within a recovery unit or the habitat and desert tortoises must be managed intensively enough to ensure long-term viability;
3. Populations of desert tortoises within each recovery unit must be managed so discrete population growth rates (λ s) are maintained at or above 1.0;
4. Regulatory mechanisms or land management commitments that provide for long-term protection of desert tortoises and their habitat must be implemented; and

5. The population of the recovery unit is unlikely to need protection under the Endangered Species Act in the near future.

The recovery plan based its descriptions of the six recovery units on differences in genetics, morphology, behavior, ecology, and habitat use over the range of the Mojave population of the desert tortoise. The recovery plan contains generalized descriptions of the variations in habitat parameters of the recovery units and the behavior and ecology of the desert tortoises that reside in these areas (pages 20 to 22 in Service 1994). The recovery plan (pages 24 to 26 from Service 1994) describes the characteristics of desert tortoises and variances in their habitat, foods, burrow-sites, and phenotypes across the range of the listed taxon. Consequently, to capture the full range of phenotypes, use of habitat, and range of behavior of the desert tortoise as a species, conservation of the species across its entire range is essential.

The Service (2008c) has released a revised recovery plan for public review. The revised recovery plan includes a discussion of reducing the number of recovery units to four, based on information generated since the release of the original document. As of this time, we have not issued a final revised recovery plan.

Relationship of Recovery Units, Distinct Population Segments, Desert Wildlife Management Areas, and Critical Habitat Units

The recovery plan (Service 1994) recognized six recovery units or evolutionarily significant units across the range of the listed taxon, based on differences in genetics, morphology, behavior, ecology, and habitat use of the desert tortoises found in these areas. The boundaries between these areas are vague. In some cases, such as where the Western Mojave Recovery Unit borders the Eastern Mojave Recovery Unit, a long, low-lying, arid valley provides a substantial separation of recovery units. In other areas, such as where the Eastern Mojave Recovery Unit borders the Northern Colorado Recovery Unit, little natural separation exists. Over the years, workers have commonly referred to the areas as “recovery units;” the term “distinct population segment” has not been in common use.

The recovery plan recommended that land management agencies establish one or more desert wildlife management areas within each recovery unit. As mentioned previously in the Recovery Plan for the Desert Tortoise section of this biological opinion, the recovery plan recommended that these areas receive reserve-level management to remove or mitigate the effects of the human activities responsible for declines in the number of desert tortoises. As was the case for the recovery units, the recovery plan did not determine precise boundaries for the desert wildlife management areas. The recovery team intended for land management agencies to establish these boundaries, based on the site-specific needs of the desert tortoise. At this time, desert wildlife management areas have been established throughout the range of the desert tortoise.

Based on the recommendations contained in the draft of the original recovery plan for the desert tortoise, the Service designated critical habitat units throughout the range of the desert tortoise

(59 Federal Register 5820). The 14 critical habitat units have defined boundaries and cover specific areas throughout the 6 recovery units.

The Bureau used the boundaries of the critical habitat units and other considerations, such as conflicts in management objectives and more current information, to propose and designate desert wildlife management areas through its land use planning processes. In California, the Bureau also classified these desert wildlife management areas as areas of critical environmental concern, which allows the Bureau to establish management goals for specific resources in defined areas. Through the land use planning process, the Bureau established firm boundaries for the desert wildlife management areas.

Finally, we note that the Department of Defense installations and National Park Service units in the California desert did not establish desert wildlife management areas on their lands. Where the military mission is compatible with management of desert tortoises and their habitat, the Department of Defense has worked with the Service to conserve desert tortoises and their habitat. Examples of such overlap include the bombing ranges on the Navy's Mojave B and the Chocolate Mountains Aerial Gunnery Ranges. Although the target areas are heavily disturbed, most of the surrounding land remains undisturbed. Additionally, the Army has established several areas along the boundaries of Fort Irwin where it prohibits training with vehicles. Desert tortoises persist in these areas, which are contiguous with lands off base. The National Park Service did not establish desert wildlife management areas within the Mojave National Preserve, because the entire preserve is managed at a level that is generally consistent with the spirit and intent of the recovery plan for the desert tortoise.

The following table depicts the relationship among recovery units, desert wildlife management areas, and critical habitat units through the range of the desert tortoise.

Critical Habitat Unit	Desert Wildlife Management Area	Recovery Unit	State	Size of Critical Habitat Unit (acres)
Chemehuevi	Chemehuevi	Northern Colorado	CA	937,400
Chuckwalla	Chuckwalla	Eastern Colorado	CA	1,020,600
Fremont-Kramer	Fremont-Kramer	Western Mojave	CA	518,000
Ivanpah Valley	Ivanpah Valley	Eastern Mojave/Northeastern Mojave	CA	632,400
Pinto Mountain	Joshua Tree	Western Mojave/ Eastern Colorado	CA	171,700
Ord-Rodman	Ord-Rodman	Western Mojave	CA	253,200
Piute-Eldorado-CA	Fenner	Eastern Mojave	CA	453,800
Piute-Eldorado-	Piute-Eldorado	Northeastern Mojave/ Eastern Mojave	NV	516,800

Critical Habitat Unit	Desert Wildlife Management Area	Recovery Unit	State	Size of Critical Habitat Unit (acres)
NV				
Superior-Cronese	Superior-Cronese Lakes	Western Mojave	CA	766,900
Beaver Dam: NV UT AZ	Beaver Dam Beaver Dam Beaver Dam	Northeastern Mojave (all)	NV UT AZ	87,400 74,500 42,700
Gold Butte-Pakoon NV AZ	Gold Butte-Pakoon Gold Butte-Pakoon	Northeastern Mojave (all)	NV AZ	192,300 296,000
Mormon Mesa	Mormon Mesa Coyote Spring	Northeastern Mojave	NV	427,900
Upper Virgin River	Upper Virgin River	Upper Virgin River	UT	54,600

Status

The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California. On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 Federal Register 32326). In its final rule, dated April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 Federal Register 12178).

The Service listed the desert tortoise in response to loss and degradation of habitat caused by numerous human activities including urbanization, agricultural development, military training, recreational use, mining, and livestock grazing. The loss of individual desert tortoises to increased predation by common ravens, collection by humans for pets or consumption, collisions with vehicles on paved and unpaved roads, and mortality resulting from diseases also contributed to the Service's listing of this species.

Before entering into a discussion of the status and trends of the desert tortoise in the Western Mojave Recovery Unit where the proposed action is located, a brief discussion of the methods of estimating the numbers of desert tortoises would be useful. Three primary methods have been widely used: permanent study plots, triangular transects, and line-distance sampling. Generally, permanent study plots are areas visited at roughly four-year intervals to determine the numbers of desert tortoises present. Desert tortoises found on these plots during the initial spring surveys are registered. That is, individuals are marked for identification during subsequent surveys. Between 1971 and 1980, 27 plots were established in California to study the desert

tortoise. Berry (1999) monitored desert tortoises on fifteen of these plots on a long-term basis. Range-wide, 49 plots were used at one time or another to attempt to monitor desert tortoises (Tracy et al. 2004).

Triangular transects are used to detect sign (i.e., scat, burrows, footprints, etc.) of desert tortoises. The number of sign is then correlated with standard reference sites, such as permanent study plots, to allow the determination of density estimates.

Finally, line-distance sampling involves walking transects while trying to detect live desert tortoises. An estimation of density can be made by measuring the distance of the desert tortoise from the transect centerline, measuring the distance the desert tortoise is observed along the transect length, and calculating the percentage of animals in the area that were likely to be above ground and visible to surveyors during the time the transect was walked. This density is only represents an estimation of the number of desert tortoises that are greater than 180 millimeters in size. Desert tortoises that are larger than this size are typically classified as subadult or adult desert tortoises.

Each of these methods has various strengths and weaknesses. In general, permanent study plots are used to estimate the status of desert tortoises across large areas over time. Triangular transects were used to assess the density of desert tortoises on specific sites at a point in time. This method was commonly used to determine how many desert tortoises might be affected by a specific proposed action. In 2001, the Service initiated line-distance sampling to estimate the density of desert tortoises in desert wildlife management areas and critical habitat throughout their range.

Note that, when reviewing the information presented in the following sections, determining the number of desert tortoises over large areas is extremely difficult. The report prepared by the Desert Tortoise Recovery Plan Assessment Committee (Tracy et al. 2004) acknowledges this fact. Desert tortoises spend much of their lives underground or concealed under shrubs, are not very active in years of low rainfall, and are distributed over a wide area in several different types of habitat. Other factors, such as the inability to sample on private lands and rugged terrain, further complicate sampling efforts. Consequently, the topic of determining the best way to estimate the abundance of desert tortoises has generated many discussions over the years. Because of this difficulty, we cannot provide concise estimations of the density of desert tortoises in each recovery unit or desert wildlife management area in a consistent manner.

Given the difficulty in determining the density of desert tortoises over large areas, the reader needs to understand that the differences in density estimates in the recovery plan and those derived from subsequent sampling efforts may not accurately reflect on-the-ground conditions. Despite this statement, the reader should also be aware that the absence of live desert tortoises and the presence of carcasses over large areas of some desert wildlife management areas provide at least some evidence that desert tortoise populations seem to be in a downward trend in some regions.

The following paragraphs provide general information on the status and trends of the desert tortoise population in the Western Mojave Recovery Unit, where the proposed action is located. We have not included detailed information on the status of the desert tortoise in the other recovery units throughout the range of the species in this biological opinion. This omission will not compromise the analysis in the biological opinion because our determination regarding whether a proposed action is likely to jeopardize the continued existence of a species must be conducted at the level of the listed taxon. When the range of the listed taxon is divided into recovery units, our level of analysis begins with the recovery unit. If the effects of the proposed action have the potential to compromise the ability of the species to survive and recover within the recovery unit, the next level of analysis considers how the compromised recovery unit would affect the listed taxon throughout its range (Service 2005). Therefore, we conduct our analysis in a comprehensive manner through an iterative process. The Western Mojave Recovery Unit comprises one of six recovery units for the desert tortoise; consequently, our level of analysis in this biological opinion will begin at this level.

The Western Mojave Recovery Unit is located entirely in California, situated west of the Eastern Mojave, Northern Colorado, and Eastern Colorado Recovery Units. Four critical habitat units and four desert wildlife management areas are located within this recovery unit. Tracy et al. (2004) and Service (1994) note that densities on permanent study plots in various locations (Fremont Valley, Johnson Valley, Stoddard Valley, Fremont Peak, Kramer Hills, Lucerne Valley, and the Desert Tortoise Natural Area) across the Western Mojave Recovery Unit have shown a significant negative trend in adult densities over time.

In the Western Mojave Recovery Unit, desert tortoises generally occur from Olancho and the northern Panamint Valley in the north, to Joshua Tree National Park in the south, and from the lower foothills of the southern Sierra Nevada and Tehachapi Mountains in the west, and east to Death Valley and the eastern side of Joshua Tree National Park. Although desert tortoises were historically widespread in the western Mojave Desert, their distribution within this region was not uniform. For example, desert tortoises likely occurred at low densities in the juniper woodlands of the western Antelope Valley and in the sandier habitats in the Mojave River valley. Likely, they were also largely absent from the higher elevations of the area's mountains and from playas and the areas immediately surrounding these dry lakes.

The following paragraphs describe the status of the desert tortoise outside of desert wildlife management areas in the Western Mojave Recovery Unit. At the Fort Irwin Military Base, the Army conducts realistic, large-scale exercises with large numbers of wheeled and tracked vehicles. In areas where training has occurred for many decades, desert tortoises persist in relatively low numbers primarily on the steep, rugged slopes of the mountain ranges and in incised washes that occur throughout Fort Irwin. Desert tortoises persist here because vehicles generally do not use these areas. We do not have specific information on the numbers of desert tortoises in these areas. We expect that they will persist long into the future as small aggregations of animals that are likely isolated from desert tortoises in the remainder of the Western Mojave Recovery Unit. Some exchange may occur with desert tortoises in the South

Range portion for the Naval Air Weapons Station to the west of Fort Irwin, and a narrow strip of Bureau lands and Death Valley National Park to the north.

The Naval Air Weapons Station, China Lake, is divided into two large units. The southern unit lies to the west of Fort Irwin and north of the western expansion area, and the northern portion of the Naval Air Weapons Station lies to the northwest of the southern unit. The Department of the Navy (Navy) has designated approximately 200,000 acres of the South Range at the Naval Air Weapons Station, China Lake as a management area for the desert tortoise (Service 1995b). Through a consultation with the Service (1992a), the Navy agreed to try to direct most ground-disturbing activities outside of this area, to use previously disturbed areas for these activities when possible, and to implement measures to reduce the effects of any action on desert tortoises. This area also encompasses the Superior Valley Tactical Bombing Range located in the southernmost portion of the Mojave B South land management unit of the Naval Air Weapons Station. It is as an active bombing range for military test and training operations by the Navy and Department of Defense. In the three years for which we had annual reports available, activities conducted by the Navy did not kill or injure any desert tortoises (Navy 1995, 2001, 2002). In general, desert tortoises occur in low densities on the North Range of the Naval Air Weapons Station. Kiva Biological Consulting, and McClenahan and Hopkins Associates (in Service 1992a) reported that approximately 136 square miles of the North Range supported densities of 20 or fewer desert tortoises per square mile. The South Range supported densities of 20 or fewer desert tortoises per square mile over an area of approximately 189 square miles and densities of greater than 20 per square mile in approximately 30 square miles. The higher elevations and latitude in this area may be responsible for these generally low densities (Weinstein 1989 in Bureau et al. 2005).

The Indian Wells Valley, which is located to the southwest of the northern portion of the Naval Air Weapons Station, most likely supported desert tortoises at higher densities in the past. Current low densities in this area are probably due to urban, suburban, and agricultural developments. The city of Ridgecrest and town of Inyokern are located in this valley. Rose Valley, which lies generally to the north of the Indian Wells Valley and west of the northern portion of the Naval Air Weapons Station seems to support few desert tortoises and is likely the northern extent of the species' range in this portion of the Western Mojave Recovery Unit.

To the south of the Indian Wells Valley and extending west to the eastern slopes of the Sierra Nevada and Tehachapi Mountains, desert tortoises occur in generally low numbers on a mix of Bureau and private lands. They may have been more common in the past in the area west of Highway 14 between the town of Mojave and Walker Pass. High levels of off-road vehicle use and extensive livestock grazing are potential causes for the current scarcity of desert tortoises in this area. On public lands, the Bureau manages grazing by domestic sheep according to the standards and guidelines established in the California Desert Conservation Area Plan amendments for the western Mojave Desert (Bureau et al. 2005). We are unaware of any standards and guidelines associated with sheep grazing on private lands. Off-road vehicle use is also commonplace in this portion of the desert.

The western end of Antelope Valley lies south of the Tehachapi Mountains and north of the western end of the San Gabriel Mountains. This far western portion of the Mojave Desert supported juniper and Joshua tree woodlands. Desert tortoises may not have been common here, even prior to the arrival of the agricultural development that covers much of the valley. Desert tortoises persist in low numbers in creosote scrub habitat in portions of the valley. Sheep grazing, off-road vehicle use, and rural development occur in this area also. Some areas support wind energy operations. Most of the land is under private ownership.

The Department of Defense uses Edwards Air Force Base, which lies in the eastern portion of the Antelope Valley, primarily to test aircraft and weapons systems. Desert tortoises occur over approximately 220,800 acres of the installation. Approximately 80,640 acres of the base are naturally unsuitable for use by desert tortoise or are used for military operations, such as Rogers and Rosamond dry lakes. Based on surveys conducted between 1991 and 1994, approximately 160,640 acres of the base supported 20 or fewer desert tortoises per square mile. Approximately 55,040 acres supported densities between 21 and 50 desert tortoises per square mile. From 51 to 69 desert tortoises per square mile occurred on several smaller areas that totaled 5,120 acres (Air Force 2004). We expect that current densities are somewhat lower, given the regional declines in desert tortoise numbers elsewhere in the Western Mojave Recovery Unit.

Four townships of private land east of California City, north of Edwards Air Force Base, and south of the Rand Mountains supported large numbers of desert tortoises as late as the 1970s. High levels of off-road vehicle use, extensive grazing of sheep, scattered development, and possibly poaching have greatly reduced the density of desert tortoises in this area.

South of Edwards Air Force Base, the direct and indirect effects of urban and suburban development have largely eliminated desert tortoises from this area of primarily private lands that extends from Lancaster in the west to Lucerne Valley in the east. A few desert tortoises remain on the northern slopes of the San Bernardino Mountains, south of Lucerne Valley; however, they seem to be largely absent from the portion of this area in Los Angeles County (Bureau et al. 2005). The Bureau manages the 24,000-acre El Mirage Off-highway Vehicle Management Area, which lies south of the eastern portion of Edwards Air Force Base. The Bureau has designated this and three other off-highway vehicle management areas in the western Mojave Desert for use by off-road vehicles. Low numbers of desert tortoises persist in the area that generally lies between the off-highway vehicle management area and Edwards Air Force Base.

Continuing to the east, the northern portion of Joshua Tree National Park is within the Western Mojave Recovery Unit. Given the general patterns of visitor use at Joshua Tree National Park (i.e., most visitors remain close to established roads and trails), we expect that most of these areas receive little use. Private lands between the northern boundary of Joshua Tree National Park and the southern boundary of the Marine Corps Air Ground Combat Center continue to support desert tortoises. The primary threat to desert tortoises in this area is urbanization. The cities of Twentynine Palms, Yucca Valley, Joshua Tree, and Morongo Valley are located in this area.

Desert tortoises occur within the Marine Corps Air Ground Combat Center in densities of greater than 50 per square mile in limited areas. Most of the installation, however, supports from zero to five animals per square mile (Jones and Stokes Associates 1998 in Natural Resources and Environmental Affairs Division 2001). The Marine Corps' integrated natural resource management plan also notes that the number of desert tortoises may have declined in the more heavily disturbed areas of the Marine Corps Air Ground Combat Center and that vehicle strikes, common ravens, and dogs are responsible for mortalities. In general, the Marine Corps Air Ground Combat Center supports a wide variety of training exercises that include the use of tracked and wheeled vehicles, and live fire.

The 189,000-acre Johnson Valley Off-highway Vehicle Management Area lies to the west of the Marine Corps Air Ground Combat Center. The Stoddard Valley Off-highway Vehicle Management Area lies to the west of the Johnson Valley Off-highway Vehicle Management Area. Desert tortoises remain in suitable habitat primarily in areas with less recreation use.

The Mojave River valley lies to the northwest of the Marine Corps Air Ground Combat Center. It is generally a low-lying area dominated by private lands with current and fallow agricultural use. We are aware of a few records of desert tortoises in this area, primarily in creosote scrub habitat near the Marine Corps Logistics Base, Nebo, and around Elephant Mountain, which lies at the western end of the valley.

To the east of the Mojave River valley, the Cady Mountains contain numerous valleys and alluvial fans that support desert tortoises. In 2010, we issued a biological opinion to the Bureau for the construction, operation, and maintenance of a 4,613-acre solar power generating facility on the alluvial fan between the southern end of the Cady Mountains and Interstate 40 (Service 2010). We determined that the proposed action would not jeopardize the continued existence of the desert tortoise but anticipated it would result in the mortality of 30 juvenile desert tortoises and the destruction of 87 eggs. We established thresholds for re-initiation of dead or injured 6 subadult and adult desert tortoises over the life of the project or 2 in any given year. We also established a threshold that would be reached if monitoring detected a statistically significant difference in mortality between the control and resident or translocated populations. Construction of this project has not begun.

The city of Barstow lies at the western end of the Mojave River valley. A large expanse of primarily private land lies between Barstow and the city of Victorville. Now heavily used by off-road vehicles, this area likely supported high densities of desert tortoises prior to the development of surrounding areas. The cities of Adelanto, Apple Valley, and Hesperia, and the Southern California Logistics Airport generally surround Victorville.

Death Valley National Park lies to the north of Fort Irwin. Desert tortoises are uncommon in the national park, primarily because much of the habitat lies either lower or higher than optimal elevations for the species. Greenwater Valley, to the east of Death Valley, seems to support a moderate number of desert tortoises. Panamint Valley lies to the west of Death Valley, and east

of the northern section of the Naval Air Weapons Station. It supports low densities of desert tortoises, likely because of unsuitable habitat over large areas of the valley.

The Spangler Hills Off-highway Vehicle Management Area lies to the southwest of the Panamint Valley and southeast of Ridgecrest. We do not have recent information on the number of desert tortoises in this area. We expect that these areas support low densities of desert tortoises because of extensive recreational use.

Major roads include Interstates 15 and 40, and State Routes 14, 18, 58, 62, 127, 138, 178, 247, and U.S Highway 395. These roads fragment habitat. Vehicles using these roads strike and kill numerous desert tortoises every year. Portions of Interstate 15 and State Route 58 are fenced to prevent entry by desert tortoises. Smaller paved roads and unpaved roads probably do not fragment habitat to a substantial degree but are responsible for additional mortalities of desert tortoises.

The Service uses line-distance sampling to estimate the density of desert tortoises in monitored areas within the Western Mojave Recovery Unit; based on the latest information, we estimate the density to be approximately 10.1 subadult and adult desert tortoises per square mile (Service 2009b, 2010c, 2010d); we averaged the densities from sampling years 2007 through 2010). However, we do not have extensive data on the density of desert tortoises in the areas of the recovery unit that lie outside desert wildlife management areas. With the exception of two areas in 2007 (see Service 2009b), existing data were collected using methods other than line-distance sampling and are not comparable to the numbers obtained through line-distance sampling. Examples include a Bureau study of desert tortoise density west of State Route 14 between Red Rock Canyon State Park and State Route 178 (Keith et al. 2005) and various surveys of the eastern Antelope Valley, Victor Valley, and near the town of Rosamond. Consequently, we do not have comparable information regarding densities for most areas outside of critical habitat and desert wildlife management areas.

The following paragraphs describe the status of the desert tortoise within desert wildlife management areas in the Western Mojave Recovery Unit. The Ord-Rodman Desert Wildlife Management Area is located southeast of Barstow. It lies south of Interstate 40, east of State Route 247, west of Argus Mountain, and north of the central portion of the Fry Mountains. The recovery plan states that densities of desert tortoises in this recovery unit vary from 5 to 150 animals per square mile (Service 1994). In 2010, the Service (2010d) estimated a density for the Ord-Rodman Desert Wildlife Management Area of approximately 19.5 subadult and adult desert tortoises per square mile based on line-distance sampling transects.

The Superior-Cronese Desert Wildlife Management Area is bordered on the west by the Fremont-Kramer Desert Wildlife Management Area and Cuddleback Dry Lake; on the north by the northern end of Superior Valley and NASA Road on the National Training Center; on the east by West Cronese Dry Lake; on the southeast by Interstate 15; and on the south and southwest by Rainbow Basin National Natural Landmark and the southern end of the Gravel Hills. The recovery plan states that densities of desert tortoises in this recovery unit vary from

20 to 250 animals per square mile (Service 1994). In 2010, the Service (2010d) estimated a density for the Superior-Cronese Desert Wildlife Management Area of approximately 6.8 subadult and adult desert tortoises per square mile based on line-distance sampling transects.

The Fremont-Kramer Desert Wildlife Management Area is located west of the Superior-Cronese Desert Wildlife Management Area on both sides of U.S. Highway 395. Density estimates for the Fremont-Kramer Desert Wildlife Management Area, as determined on permanent study plots and strip-transects between 1990 and 1991, varied from 5 to 100 animals per square mile with average densities of approximately 15 individuals per square mile (Service 1994). In 2010, the Service (2010d) estimated a density for the Fremont-Kramer Desert Wildlife Management Area of approximately 6.5 subadult and adult desert tortoises per square mile based on line-distance sampling transects.

The Pinto Mountain Desert Wildlife Management Area is located north of the northeastern corner of Joshua Tree National Park. The recovery plan does not specifically address the density of desert tortoises in this area (Service 1994). In 2010, the Service (2010d) estimated a density for this desert wildlife management area to be approximately 8.8 subadults and adults per square mile based on line-distance sampling transects.

In previous consultations (e.g., regarding the California Desert Conservation Area [Service 2007]), we estimated the numbers of desert tortoises in various recovery units based primarily on the densities provided by line-distance sampling and the acreages of desert wildlife management areas, units of critical habitat, and other potential habitat without adjustment for the potential suitability of habitat. We did not attempt to eliminate areas of non-habitat because of the difficulty in determining such areas on the scale of the recovery units. Since that time, Nussear et al. (2009; see the next section of this biological opinion [Habitat of the Desert Tortoise within the Western Mojave Recovery Unit] for a description of their methodology) developed a model of desert tortoise habitat that allows us to estimate the area of desert tortoise habitat. We used this model to estimate the amount of potential desert tortoise habitat in an area, then removed areas of such habitat that have been subjected to human disturbance by using data from The Nature Conservancy (2010).

Data on the density of desert tortoises are largely lacking from outside of critical habitat and desert wildlife management areas. To estimate the number of desert tortoises in these areas, we have provided a potential range of densities by multiplying the acreage of these areas by the average density as determined by line-distance sampling within desert wildlife management areas and critical habitat as an upper limit; for the lower limit, we multiplied this acreage by one-tenth of the average density.

Using this method, we can likely provide a more accurate estimate of the number of desert tortoises over large areas of the desert. The accuracy of the estimates derived from this method remain subject to numerous variables that likely affect its overall accuracy (e.g., the digitizing of the recovery unit boundaries, the scale at which the Nussear et al. model was developed, the accuracy of the information from The Nature Conservancy, etc.). Despite the unknowns

involved in deriving this estimate, it provides us with some quantification of the number of subadult and adult desert tortoises in a recovery unit. The estimates of subadult and adult desert tortoises in the Western Mojave Recovery Unit used in this biological opinion follow:

Western Mojave Recovery Unit ¹	Area (square miles)	Density of Desert Tortoises per Square Mile	Number of Desert Tortoises
Total Area of Modeled Desert Tortoise Habitat ²	13,385		
Disturbed Modeled Desert Tortoise Habitat ³	910		
Net Modeled Desert Tortoise Habitat ⁴	12,475		
Net Modeled Desert Tortoise Habitat within Desert Wildlife Management Areas and Critical Habitat	4,997	10.1 ⁵	50,470
Net Remaining Modeled Desert Tortoise Habitat outside Desert Wildlife Management Areas and Critical Habitat	7,478	10.1 ⁶	75,528
		1.0 ⁷	7,478
Total Number of Desert Tortoises			57,948 - 125,998

Key

¹ Unless otherwise noted, all acreages are from Waln 2011.

² Modeled desert tortoise habitat is from Nussear et al. (2009).

³ From USC or TNC

⁴ The area of Modeled Desert Tortoise Habitat minus the area of disturbed modeled desert tortoise habitat.

⁵ From Service (2009b, 2010c, 2010d); we averaged the densities from sampling years 2007 through 2010.

⁶ We do not have substantial information on the number of desert tortoises outside of desert wildlife management areas and critical habitat. Consequently, in this section, we use the same density we derived for the desert wildlife management areas and critical habitat.

⁷ See footnote 6. In this section, we used a density of one-tenth of that in desert wildlife management areas and critical habitat.

Based on the estimate of the number of subadult and adult desert tortoises in the Western Mojave Recovery Unit, we estimated the number of juvenile desert tortoises and eggs that the area also supports as described in the Environmental Baseline - Status of the Desert Tortoise in the Action Area section of this biological opinion. (Eggs would be present only for a portion of any given year.) The following tables depict these estimates:

	Number of Subadult and Adult Desert Tortoises ¹	Number of Juvenile Desert Tortoises ²
Within Desert Wildlife Management Areas and Critical Habitat	50,470	52,530
Outside Desert Wildlife Management Areas and Critical Habitat	75,528 ³	78,611
	7,478 ⁴	7,783
Total Number of Juvenile Desert Tortoises		60,313 – 131,141 ⁵

Key:

¹ From preceding table.

² Derived by assuming that juveniles comprise 51 percent of the overall population. (See the Environmental Baseline – Status of the desert tortoise in the Action Area section of this biological opinion for all references.)

³ Upper limit estimate of the number of subadult and adult desert tortoises outside of desert wildlife management areas and critical habitat.

⁴ Lower limit estimate of the number of subadult and adult desert tortoises outside of desert wildlife management areas and critical habitat.

⁵ These estimates are the ‘within’ number added to the ‘low range’ or ‘high range’ numbers.

	Number of Subadult and Adult Female Desert Tortoises ¹	Number of Juvenile Desert Tortoise Eggs ²
Within Desert Wildlife Management Areas and Critical Habitat	25,235	234,181
Outside Desert Wildlife Management Areas and Critical Habitat	37,764 ³	350,450
	3,739 ⁴	34,698
Total Number of Juvenile Desert Tortoises		268,879 - 584,631 ⁵

Key:

¹ We assumed a ratio of males to females of 1:1. These estimates were derived by dividing the number of subadult and adult desert tortoises from the previous tables by 2.

² Derived by assuming that each female produces 1.6 clutches with 5.8 eggs per clutch.

³ High range estimate of the number of subadult and adult female desert tortoises outside of desert wildlife management areas and critical habitat.

⁴ Low range estimate of the number of subadult and adult female desert tortoises outside of desert wildlife management areas and critical habitat.

⁵ These estimates are the 'within' number added to the 'upper limit' or 'lower limit' numbers.

Habitat of the Desert Tortoise within the Western Mojave Recovery Unit

Nussear et al. (2009) modeled desert tortoise habitat across the range of the desert tortoise. This model, based on 3,753 desert tortoise locations, uses 16 environmental variables, such as precipitation, geology, vegetation, and slope. In addition, Nussear et al. (2009) used 938 additional occurrence locations to test the model's accuracy. Although this analysis likely omits some marginal desert tortoise habitat, it explains the occurrence of 95 percent of the 938 test points used in the Nussear et al. (2009) model. The modeling and mapping analysis do not consider habitat loss, fragmentation, or degradation associated with human-caused impacts.

Because the modeling and mapping analysis do not consider habitat loss, fragmentation, or degradation associated with human-caused impacts, we estimated how much modeled desert tortoise habitat has likely been degraded or lost by subtracting the acreage of urbanized and agricultural areas as shown by The Nature Conservancy (2010) from the total. Based on this calculation, approximately 12,475 square miles of potential desert tortoise habitat remain within the Western Mojave Recovery Unit (Waln 2011). (We subtracted only The Nature Conservancy's "highly disturbed" category from the total amount of potential desert tortoise habitat. The Nature Conservancy's 'moderately disturbed' category contains some areas that, based on our knowledge, are highly disturbed and support few, if any desert tortoises (e.g., maneuver areas at Fort Irwin) and other areas that are somewhat less disturbed and continue to support some desert tortoises (e.g., some private lands). At this time, we do not have the ability to separate out and quantify these areas.)

The acreages depicted here of desert tortoise habitat and the amount of development are not precise, given the difficulty of mapping at this scale. They do, however, provide a reference point relative to the amount of desert tortoise habitat within the Western Mojave Recovery Unit. This information also demonstrates that, although large amounts of desert tortoise habitat remain in the Western Mojave Recovery Unit, human activities have removed a substantial amount of modeled habitat and fragmented the remaining habitat to some degree. As our ability to quantify disturbance and estimate the density of desert tortoises improves, we expect to refine these estimates further.

Fires

Since December 2004, numerous wildfires have occurred in desert tortoise habitat across its range. Although we know that some desert tortoises were killed by wildfires, mortality estimates are not available. We estimate that approximately 300,000 acres of potential desert tortoise habitat burned in the Northeastern Mojave Recovery unit in 2005 (Burroughs 2005). This

acreage includes approximately 109,000 acres of critical habitat (Clayton 2005). In total, approximately 136,447 acres of critical habitat burned in the 2005 fires (Clayton 2005).

Recovery Unit	Critical Habitat Unit	Acres Burned
Upper Virgin River	Upper Virgin River	10,446
Northeastern Mojave	Beaver Dam Slope	46,757
Northeastern Mojave	Gold Butte-Pakoon	62,466
Northeastern Mojave	Mormon Mesa	15,559
Eastern Mojave	Piute-Eldorado	154
Eastern Mojave	Ivanpah	1,065
Total		136,447

The 136,447 acres of critical habitat that burned represent approximately 2.1 percent of the total amount of critical habitat that designated for the desert tortoise. Given the patchy distribution of the primary constituent elements of critical habitat across the critical habitat units and the varying intensity of the wildfires, we cannot quantify precisely the extent to which these fires disrupted the function and value of the critical habitat.

ENVIRONMENTAL BASELINE

Action Area

The implementing regulations for section 7(a)(2) of the Act define the “action area” as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this biological opinion, we consider the action area to include all areas of the 1,765-acre project site and the 137.25 kilometers of fiber optic line and their necessary components as described in the Description of the Proposed Action section of this biological opinion, a 797-meter buffer from the Mojave Solar facility project boundary, the proposed desert tortoise translocation areas, all contiguous desert tortoise habitat within 1.5 kilometers of the translocation areas receiving desert tortoises from less than 500 meters, all contiguous desert tortoise habitat within 6.5 kilometers of translocation areas receiving desert tortoises from greater than 500 meters away, and all desert tortoise habitat within a 1,000-meter buffer centered around the fiber optic line (500 meters on each side).

We included the 797-meter buffer from the project boundary to address adverse effects to desert tortoises whose home ranges overlap the proposed solar facility; the buffer is based on the assumption that the home range of a male desert tortoise is approximately 2 square kilometers (O’Conner et al. 1994, Duda et al. 1999, Harless et al. 2009). We included habitat within 1.5 and 6.5 kilometers of the translocation areas to address the area in which desert tortoises may disperse following translocation. For situations where desert tortoises are translocated less than 500 meters, the buffer is based on the maximum straight-line distance that a male desert tortoise traveled in the first year following translocation (Walde et al. 2008). For situations where desert tortoises are translocated more than 500 meters, the buffer is based on the upper limits of the 95 percent confidence interval for the maximum straight-line distance that male and female desert

tortoises were observed to disperse during the first year after release (Nussear 2004, Field et al. 2007, Drake et al. 2009). We included the buffer around the fiber optic line to address the area where a desert tortoise could be placed if it must be moved from harm's way during the installation of the lines.

The action area defined for this biological opinion covers approximately 57,381 acres of desert tortoise habitat. The translocation areas for the proposed Mojave Solar facility are the lands adjacent to the project site that contain suitable desert tortoise habitat. These areas include the land on the west edge of the Alpha site and the eastern and southern edge of the Beta site (Karl 2011).

Past Consultations in the Action Area

The Service (1989a) issued a biological opinion to the Bureau for the construction of the existing solar facility at Harper Dry Lake and the power lines that connect the facility to the electrical grid. We concluded that the proposed action was not likely to jeopardize the continued existence of the desert tortoise; although the electrical lines from the existing facility cross critical habitat, the Service had not designated critical habitat at the time of this consultation. This consultation resulted in the installation of fencing to exclude desert tortoises along most of the length of Harper lake Road. We anticipated that 10 desert tortoises were likely to be taken as a result of the proposed action; we have not received any reports of desert tortoises being injured or killed as a result of construction and operation of the solar power plant.

The Service (1989b) issued a biological opinion to the Federal Highway Administration for the widening of a portion of State Route 58. We concluded that the proposed action was not likely to jeopardize the continued existence of the desert tortoise; the Service had not designated critical habitat at the time of this consultation. This consultation resulted in the installation of fencing to exclude desert tortoises along approximately 15 miles of State route 58. We anticipated that 5 desert tortoises were likely to be taken as a result of the proposed action; to the best of our knowledge, no desert tortoises were killed or injured during the widening project.

The Service (1990) issued a biological opinion for the Kern River and Mojave Pipeline projects. The biological opinion anticipated that pipeline installation would kill or injure 15 desert tortoises along the Mojave River portion of the line in addition to harassing 120 desert tortoises and eliminating 16 nests. For the operation and maintenance of the pipeline, the biological opinion anticipated the harm or mortality of five desert tortoises and the harassment of ten desert tortoises. The Mojave Pipeline crosses the Kramer to Victor fiber optic line. In total, 38 desert tortoises were killed during the construction of these 2 pipelines (Circle Mountain Biological Consultants 1996). We cannot determine whether any desert tortoises were killed within the portion of the action area included in this biological opinion; however, given the small overlap of the action areas of the two consultations, we expect that few, if any, desert tortoises were encountered in this area during construction of the pipeline.

We issued a biological opinion to the Bureau for the construction, operation, and maintenance of a 230-kV translocation from Kramer Junction to Victorville (Service 1991). The proposed action would result in the permanent loss of approximately 4 acres of habitat; although the transmission line passes through critical habitat of the desert tortoise, this project was completed prior to the designation of critical habitat in 1994. We anticipated that one desert tortoise was likely to be killed during construction and that five desert tortoises were likely to be killed as a result of maintenance over the 30-year life of the transmission line; we have no record of whether take actually occurred.

The Service (1995c) issued a biological opinion to the Bureau for the maintenance and repair of Southern California Gas Company's pipeline system in the California deserts. This biological opinion anticipated the mortality of two desert tortoises per year as a result of maintenance activities including travel on all associated access roads. A portion of the pipeline system passes through the action area considered in this biological opinion near the Tortilla Substation. The Southern California Gas Company has killed few desert tortoises during its maintenance activities; to the best of our knowledge, none were killed in this area of overlap.

The Service (2000) issued a biological opinion to the Bureau for the installation, operation, and maintenance of a natural gas line between Kramer Junction and Victorville by Southwest Gas Corporation. The pipeline was to be installed in the same utility right-of-way in which the fiber optic line for this consultation would be installed. We concluded that the proposed right-of-way grant was not likely to jeopardize the continued existence of the desert tortoise or adversely modify its critical habitat. This pipeline was not constructed. In 2001, the Service (2001) issued a biological opinion to the Bureau for the installation, operation, and maintenance of a natural gas line between Kramer Junction and Adelanto by the Southern California Gas Company. Except for the last 4 miles, this pipeline followed the route analyzed in the 2000 consultation. The proposed action resulted in the disturbance of approximately 355 acres of desert tortoise habitat, approximately 260 of which were located within the Fremont-Kramer Critical Habitat Unit; most of this disturbance was temporary. We anticipated that few desert tortoises were likely to be killed or injured.

The Service (2003) issued a biological opinion to the Bureau regarding the effects of the designation of routes of travel in the western Mojave Desert on the desert tortoise and its critical habitat. As a result of the proposed action, the Bureau designated routes of travel on public lands as open, closed, or limited to vehicular use. The proposed action resulted in a reduction in the mileage of open routes on public lands; additionally, any route that was not designated as open was considered to be an unauthorized route. The Service concluded that the Bureau's designation of routes of travel was not likely to jeopardize the continued existence of the desert tortoise or adversely modify its critical habitat. Although the Service did not estimate the number of desert tortoises that could be killed or injured by the project because of the large size of the action area and the patchy distribution of desert tortoises, it required the Bureau to contact the Service to determine if re-initiation was necessary if more than 5 desert tortoises were found dead or injured in a 12-month period. To date, although some desert tortoises have been killed, the re-initiation threshold has not been met; we cannot determine whether any of these

mortalities occurred within the action area for this consultation. Open routes cross the action area for this project (i.e., the fiber optic lines) in many locations.

We issued a biological opinion to the Bureau regarding the effects of a proposed amendment to the California Desert Conservation Area Plan for the western Mojave Desert on the desert tortoise and its critical habitat (Service 2006b). In this case, the Bureau's proposed action was a substantial revision of the California Desert Conservation Area Plan, with the fundamental goal of adopting numerous management prescriptions that were intended to promote the recovery of the desert tortoise. These prescriptions addressed grazing, land use classification, recreation, and numerous other elements of the Bureau's management of the western Mojave Desert, including a minor revision of the route network considered in the consultation discussed in the previous paragraph. The Service concluded that the Bureau's amendment of the California Desert Conservation Area Plan for the western Mojave Desert was not likely to jeopardize the continued existence of the desert tortoise or adversely modify its critical habitat because the vast majority of changes addressed in the amendment reduced the intensity of use and were protective of the desert tortoise. We established thresholds for the re-initiation of formal consultation in an amendment to this biological opinion (Service 2007). To date, although some desert tortoises have been killed, none of the re-initiation thresholds have been met; we cannot determine whether any of these mortalities occurred within the action area for this consultation. The entire action area for this project is within the action area for the California Desert Conservation Area Plan consultation.

We have issued several biological opinions to the Federal Highway Administration and California Department of Transportation regarding the widening of Highways 58 and 395; the fiber optic lines for the proposed action line, at least in part, along these roadways. None resulted in determinations of jeopardy or adverse modification of critical habitat. We issued a biological opinion to the Federal Highway Administration for the widening of 15 miles of State Route 58 from Kramer Junction (U.S. Route 395) to the east (Service 1989). The proposed action resulted in the loss of approximately 283 acres of habitat of the desert tortoise; although State Route 58 passes through critical habitat of the desert tortoise, this project was completed prior to the designation of critical habitat in 1994. We anticipated that five desert tortoises were likely to be killed as a result of construction; we have no record of whether take actually occurred.

We issued a biological opinion to the California Department of Transportation for the widening of approximately 16 miles of U.S. Route 395 between State Routes 18 and 58 (Service 2008d). The proposed action would result in the loss of 198 acres of habitat of the desert tortoise. We established a re-initiation threshold of three injured or dead desert tortoises. At this time, the California Department of Transportation has not initiated construction of this project (Wentworth 2011).

We issued a biological opinion to the California Department of Transportation for the widening of 16 miles of U.S. Route 395 just north of Interstate 15 (Service 2009c). The proposed action would result in the loss of 136 acres of critical habitat within the Fremont-Kramer Critical

Habitat Unit and 100 acres of habitat that lie outside this unit. We established a re-initiation threshold of four injured or dead desert tortoises. At this time, the California Department of Transportation has not initiated construction of this project (Wentworth 2011).

In aggregate, the number of desert tortoises that we anticipated would likely be killed or injured by the actions proposed in the aforementioned biological opinions comprises a relatively small portion of the desert tortoises in the action area. Furthermore, several of the biological opinions described in this section analyzed the effects of actions that extended over action areas many times the size of the action area being considered in this consultation. Therefore, the mortality associated with these larger actions would not occur or has not occurred entirely within the action area for the Abengoa project (including the upgrades to the SCE transmission lines). Consequently, we conclude that the mortality associated with these biological opinions has not substantially affected the environmental baseline of the desert tortoise within the current action area.

Habitat Characteristics of the Action Area

The proposed Mojave Solar facility site and portions of the translocation sites adjacent to the project boundary are owned by Abengoa. Additional lands within the 797-meter buffer around the solar facility are privately owned by multiple landowners and the Bureau. The fiber optic lines cross through a combination of privately owned and public lands. We summarized the information in the remainder of the Environmental Baseline section from the biological assessment (AECOM 2010) and translocation plan (Karl 2011).

The Mojave Solar facility site consists primarily of abandoned agricultural fields; one active center pivot field currently produces alfalfa on site. In addition, desert scrub habitat has recovered on approximately 430 acres of the abandoned farmland; less than 2 acres of saltbush scrub has also recovered. The buffer and translocation areas adjacent to the project site are composed of desert wash scrub, creosote bush scrub and saltbush scrub.

The SCE fiber optic lines extend across multiple plant communities; we summarize each of the three transmission corridors briefly, additional details can be found in the biological assessment (AECOM 2010). The Lockhart to Tortilla substation fiber optic line corridor contains the desert saltbush scrub, Mojave desert creosote bush scrub *Ambrosia dumosa*-dominant, fallow agriculture-ruderal, active agriculture, Mojave desert wash sandy areas, tamarisk scrub, and the Mojave River. Dominant vegetation communities and cover types along the Lockhart to Kramer substation fiber optic line corridor include desert saltbush scrub, Mojave desert creosote bush scrub *Ambrosia dumosa* dominant, Mojave desert creosote bush-*Ambrosia dumosa-Atriplex* scrub, fallow agriculture-ruderal, active agriculture, and developed areas. The Kramer to Victor substation fiber optic line corridor includes the desert saltbush scrub, Mojave desert creosote bush scrub, Mojave desert creosote bush scrub *Ambrosia dumosa*-dominant, developed areas, disturbed habitat, and Joshua tree woodland.

Most of the fiber optic lines will be installed on existing transmission lines. Although the Bureau did not provide information on the habitat characteristics along the transmission lines, access roads typically run parallel to the transmission lines and a short spur road generally leads from the access road to each pole. Each pole is surrounded by a small area of disturbance created by installation and maintenance.

Status of the Desert Tortoise in the Action Area

In April and May 2008, Abengoa conducted protocol desert tortoise surveys Service (1992b) on the 1,765-acre Mojave Solar facility site and on 3,146 acres of habitat surrounding the proposed facility. Additional reconnaissance and focused surveys were conducted on portions of the solar facility in 2006, 2007, and 2009. Over the 4 years of survey effort, Abengoa did not detect any desert tortoises within the proposed solar facility site, but detected 3 live desert tortoises within 1,000 feet of its boundary. Desert tortoise sign observed within the Mojave Solar facility boundary consisted of carcass parts, scat, and a single burrow. Surveys that extended outside of the solar facility site boundaries detected more abundant desert tortoise sign to the east, west, and south (Karl 2011).

Based on these results, we expect the Mojave Solar project site to support few, if any, resident desert tortoises. The primary reason for the paucity of desert tortoises is the disturbed nature of the site. Some potential exists that desert tortoises may occasionally cross the site or that they may enter the site to forage (when annual plants are abundant); these latter individuals may not construct burrows on the site if the previous human disturbance has disrupted the compaction of substrates to the extent that burrowing is no longer possible. Because we cannot completely dismiss the potential for desert tortoises to be present within the boundaries of the proposed solar facility, we will estimate that four individuals (of any size, i.e., juvenile, subadult and adult) may be present within this area.

The action area immediately surrounding the solar facility site contains approximately 34,365 acres of desert tortoise habitat. We estimate that this area may contain 542 subadult and adult desert tortoises, based on the average density (3.9 desert tortoises per square kilometer) of desert tortoises in the West Mojave Recovery Unit (Service 2009b, 2010c, 2010d).

Juvenile desert tortoises are extremely difficult to detect because of their small size and cryptic nature. Based on a 4-year study, Turner et al. (1987) determined that juveniles accounted for 31.1 to 51.1 percent of the overall population. Reproductive success and neonate survival are likely to vary significantly across the range of the desert tortoise. Consequently, the result of the Turner study may not adequately represent demography around the Mojave Solar project site. However, using estimated numbers for subadult and adult desert tortoises, we estimate the action area immediately surrounding the solar facility site contains 243 to 564 juveniles.

Neither SCE nor the Bureau conducted surveys of the proposed fiber optic lines. Given that the majority of the fiber optic lines parallel busy roadways where desert tortoise densities are likely depressed (Hoff and Marlow 2002) and that the areas of disturbance would be so small (23.11

acres, distributed among many smaller sites), we will not estimate the number of desert tortoises that may occur in these disturbed areas. Furthermore, we will not estimate the number of desert tortoises in the action area adjacent to the transmission lines. Because of the linear nature of this portion of the project, we anticipate that desert tortoises moved from harm's way will remain within their current home ranges and not affect adjacent animals.

By multiplying the average number of clutches produced per reproductive female in a given year (i.e., 1.6, see Turner et al. 1984) by the average number of eggs found in a clutch (5.8 eggs; Turner et al. 1986 in Service 1994), we estimate that each reproductive female could produce 9.28 eggs in a given year. Using this information and assuming a 1:1 sex ratio, we estimate that the action area immediately surrounding the solar facility site may contain as many as 271 reproductive females and 2,515 eggs in a given year. Because of the low number of desert tortoises expected to be in the solar facility site, we will not calculate the number of desert tortoise eggs that could be present. Regardless, few, if any, eggs are likely to be present because we anticipate that desert tortoises would not establish nests in the former agricultural area where the solar plant would be built. Furthermore, we will not estimate the number of desert tortoise eggs along the fiber optic lines, because the area of disturbance is so small and linear that desert tortoises are unlikely to establish nests within these areas. Because we cannot completely dismiss the potential for desert tortoise nests to be present within the boundaries of the proposed solar facility site, we will estimate that five nests (i.e., 29 eggs) may be present within this area.

We emphasize that, although our estimate of the number of subadult and adult desert tortoises, juveniles, and eggs on the project site and within action area is based on the best scientific and commercial data, as required by the implementing regulations for section 7(a)(2) (50 Code of Federal Regulations 402.14(g)(8), these numbers represent only an estimate; the overall number of animals and eggs on site may be different. We recognize that the survey data used for these estimates represents a single point in time and the number of individuals in these areas may change by the onset of construction. For example, some desert tortoises may leave or die. Alternatively, the number of desert tortoises present on the site may increase by the time construction commences. For example, one or more desert tortoises may not have been detected during the initial survey; other desert tortoises may have moved on to the site since the time of the surveys. Finally, desert tortoises may have emerged from a nest on the site; this scenario could increase the overall number of individuals; for example, if a clutch of seven eggs (i.e., the number of eggs in a clutch that would be considered large) hatched, this increase would be much more than we would expect from individuals moving on to the site.

EFFECTS OF THE ACTION

In the previous section of this biological opinion, we derived our estimates of the numbers of juvenile, subadult, and adult desert tortoises that are likely present in the action area from the pre-project survey data and published literature. These sources constitute the best available information. Consequently, we have used the estimates of the numbers of juvenile, subadult, and adult desert tortoises from the Environmental Baseline in the following analysis. Because of the desert tortoise's cryptic coloration, fossorial habits, and relatively small size, we recognize that

not all individuals that are injured or killed during construction, operations, and maintenance will be detected by monitors and workers and reported to us. Juvenile desert tortoises and eggs will be even more difficult to detect, because they are even smaller and, in the case of eggs, always hidden from sight. Lastly, scavengers may find the carcass before monitors or workers and remove it or dismember it to the extent that the cause of death may not be determinable.

During the construction, operation, and maintenance of the proposed project, desert tortoises that are overlooked could be injured. The minimization measure proposed by Abengoa and SCE, to give consideration to taking the injured individual to a veterinarian if the Service and CDFG cannot be reached, does not provide adequate protection because the desert tortoise may die if treatment is delayed.

Translocation of Desert Tortoises from the Mojave Solar Facility

The primary effects of the proposed solar facility on desert tortoises would result from their capture and translocation prior to ground disturbance associated with construction. We anticipate that Abengoa would capture and translocate all subadult and adult desert tortoises from the Mojave Solar facility site. Because of the difficulty in locating juvenile desert tortoises, Abengoa may not find all the juveniles on the solar facility site and thus may move some but not all juvenile desert tortoises from the solar facility site. Abengoa would move all desert tortoises to the translocation area nearest their points of capture.

Based on the current surveys of the Mojave Solar facility site, which indicate that desert tortoises do not occur on the site, we estimate that Abengoa would translocate few, if any, desert tortoises. Because desert tortoises have been found immediately adjacent to the site of the proposed solar facility, some may have entered the site since the last time the area was surveyed. For the purposes of this consultation, we are assuming that four desert tortoises (of all sizes) and five nests may occur within the boundary of the proposed solar facility.

Based on the previous assumption, we anticipate that Abengoa will capture, handle, and attach transmitters to no more than four desert tortoises. We have addressed the effects of capturing, handling, and attaching transmitters to these animals later in our analysis.

Abengoa will conduct health assessments on all resident desert tortoises that are within 1.5 kilometers of a desert tortoise translocated less than 500 meters and all desert tortoises within 6.5 kilometers of desert tortoises translocated greater than 500 meters. This assessment will include the collection of a blood sample and the attachment of a transmitter on all desert tortoises within the 6.5-kilometer area around desert tortoises translocated greater than 500 meters. Depending on the number of desert tortoises moved from the proposed solar site and the location to which they would be translocated, up to 542 desert tortoises may be assessed regarding their state of health. If no animals are moved greater than 500 meters, we estimate that approximately 65 desert tortoises will be handled for visual health assessments (i.e., no blood collection or attachment of transmitters) within the 1.5-kilometer buffer. Some potential exists that handling

and drawing blood from desert tortoises for disease tests may cause elevated levels of stress that may render these animals more susceptible to disease or dehydration from loss of fluids.

Translocation has the potential to increase the prevalence of diseases, such as upper respiratory tract disease, in a resident population. Some potential exists that handling and drawing blood from desert tortoises for disease tests may cause elevated levels of stress that may render these animals more susceptible to disease or dehydration from loss of fluids. In addition, stress associated with handling and movement or due to density dependent effects could exacerbate the threat of increased disease prevalence if translocated individuals with subclinical upper respiratory tract disease or other diseases begin to exhibit clinical signs of disease. This conversion of translocated desert tortoises from a non-contagious to a contagious state may increase the potential for infection in the resident population above pre-translocation levels.

We cannot reasonably predict the increase in disease prevalence within the resident population that may occur due to translocation. However, several mitigating circumstances are likely to reduce the magnitude of this threat. First, Abengoa will use experienced biologists and approved handling techniques that are unlikely to result in substantially elevated stress levels that can make translocated animals more susceptible to disease or make them convert from a non-contagious to contagious state. Second, Abengoa will conduct thorough health assessments using qualified biologists to identify any visual signs of disease for desert tortoises being moved less than 500 meters to reduce the potential of introducing disease into the resident population. Third, Abengoa will collect blood and perform additional disease tests (i.e., ELISA testing) for all desert tortoises that it moves greater than 500 meters per the recommendation of the Desert Tortoise Recovery Office (Service 2010e) to reduce the potential of introducing disease into the resident population. Fourth, the desert tortoises on the project site are currently part of a continuous population with the resident populations in the translocation area where all the desert tortoises will be moved and are likely to share similar pathogens and immunities. Fifth, Abengoa will not translocate any animal that either has clinical signs of disease or tests ELISA-positive to reduce the potential of introducing disease into the resident population. Sixth, Abengoa will buffer any resident individual showing signs of disease in the translocation area by 1.5 kilometers, when receiving individuals from less than 500 meters away, or 6.5 kilometers, when receiving individuals from greater than 500 meters away. Last, density-dependent stress is unlikely to occur for the reasons discussed later in our analysis.

Although the measures proposed by Abengoa and the other mitigating circumstances described above are substantial barriers to disease spread, the potential for post-translocation disease transmission remains. Without consideration of post-translocation dispersal in analysis of resident disease prevalence at translocation sites, some potential exists that dispersing desert tortoises may move into areas where they may contract diseases from resident animals. However, because we anticipate that the desert tortoises moved from the Mojave Solar facility site maintain a portion of their territories within the translocation area, we anticipate that dispersal distances will be minimal and therefore the potential for disease transmission associated with greater dispersal distances is low. Additionally, because no topographic or anthropogenic barriers exist between any desert tortoises in the translocation area and the project

site, these individuals have the potential to interact over time absent the translocation (although we acknowledge that moving animals may cause them to move greater distances over a shorter period of time).

Because ELISA testing can result in false positive results (i.e., an animal may test positive even though it is not a carrier of the disease), the potential exists for removal of healthy individuals from the translocated population due to concern over disease. These individuals would not be released into the wild and would no longer contribute to the population. In addition, removal of these animals may reduce the resistance of the population to disease outbreaks because they may carry immunities that could buffer the population against an outbreak that results in high mortality of animals that are not immune. Because Abengoa would coordinate with the Service and perform follow-up testing of ELISA-positive individuals, the potential for removing false-positive individuals from the translocated population is low. We expect that, of the small number of desert tortoises that may be moved from the solar facility site, only a small subset are likely to test positive for upper respiratory tract disease. Of these positive desert tortoises, an even smaller subset would test positive on a second ELISA screening. Consequently, we conclude that few desert tortoises will be incorrectly removed from the population due to false positive results.

Translocating desert tortoises may also adversely affect resident desert tortoises within the translocation area due to local increases in population density. However, because the Mojave Solar facility contains very limited habitat and no individuals were detected on the site during surveys, we expect that few desert tortoises will be found on the solar facility site. Consequently, the movement of no more than four animals into the larger surrounding area is highly unlikely to cause adverse effects related to the density of individuals. We reached this conclusion in part because Saethre et al. (2003) did not detect any trends in body condition index, reproduction, or presence of the symptoms of upper respiratory tract disease in desert tortoises in enclosures at densities far greater than those possible in this situation. Additionally, any desert tortoises that are found near the periphery of the proposed solar site likely maintain territories that include the adjacent lands and thus are already living at or near the density that would be created by the movement of a few individuals into the area.

If desert tortoises need to be translocated greater than 500 meters, Abengoa will use quarantine pens to hold them while waiting for disease test results. Abengoa will construct all quarantine pens following the specifications of the translocation plan (Karl 2011). The quarantine pens will be 50 by 50 meters and an animal husbandry plan approved by experienced personnel from an accredited American Zoological Association institution will guide care of the desert tortoises during quarantine. Maintaining the desert tortoises within quarantine pens could increase their vulnerability to exposure, stress, dehydration, inadequate food resources, and predation. Because Abengoa will regularly monitor the desert tortoises and provide care based on an approved plan and the desert tortoises will be held for a limited amount of time, we anticipate that the quarantined individuals are unlikely to experience from exposure, stress, dehydration, or inadequate nutrition. However, the potential exist that predators or poachers could target desert tortoises in the quarantine pens.

Abengoa will place juvenile desert tortoises moved greater than 100 meters into temporary holding pens so that they can acclimate to their new surroundings. Abengoa will construct the pens as described in the desert tortoise translocation plan (Karl 2011). The size of the pen will depend on how many juveniles need to be held, but will be a minimum of 6 by 15 meters. The enclosures will be covered with netting to prevent avian predators from reaching the juveniles. Maintaining the juvenile desert tortoises within pens could increase their vulnerability to exposure, stress, dehydration, inadequate food resources, and predation. Because the pens will be constructed to prevent predation and will be monitored regularly and the juveniles will be held for a limited time (approximately 2 weeks), we anticipate that the juveniles' health and safety while in the pens are unlikely to be compromised. In some instances, however, predators, such as common ravens, have been observed frequenting desert tortoise enclosures and preying on juveniles when they were released directly from the pens.

Following release, we cannot predict the movement patterns that all translocated animals are likely to exhibit. Desert tortoises translocated shorter distances (i.e., less than 500 meters) are not likely to move as far following release as those moved longer distances. Walde et al. (2008) found that maximum straight-line dispersal distance for male desert tortoises was approximately 1.5 kilometers in the first year following translocation. For desert tortoises translocated greater than 500 meters, mean straight-line dispersal distances of adult translocated desert tortoises (males and females) reported by Nussear (2004, Figures 2 and 4) were approximately 1, 1.5, 1.8, 3.5, and 6 kilometers. Walde et al. (2008) reported mean straight-line dispersal distances of adult translocated desert tortoises using 2 experimental treatments as 2.6 and 4.2 kilometers for males and 1.5 and 2.3 kilometers for females. Maximum straight-line dispersal distances for translocated male desert tortoises ranged from 6.2 to 23 kilometers in the first year following translocation (Field et al. 2007, Walde et al. 2008). Maximum straight-line dispersal distances for translocated males at each site reported in these studies varied from 6.2 kilometers (Field et al. 2007) to 7.3, 7.4, 11.3, 11.6, and 12.6 kilometers (Walde et al. 2008).

Translocated populations can also expand the area they occupy in the first year following translocation (e.g., from 3.9 to 6.9 square miles at a Nevada site; from 0.2 to 10.3 square miles at a Utah site). The degree to which these animals expand the area they use depends on whether the translocated animals are released into typical or atypical habitat; that is, if the translocation area supports habitat that is similar to that of the source area, desert tortoises are likely to move less (Nussear 2004). Translocated animals appear to reduce movement distances following their first post-translocation hibernation to a level that is not significantly different from resident populations (Field et al. 2007, Nussear 2004). As time increases from the date of translocation, most desert tortoises change their movement patterns from dispersed, random patterns to more constrained patterns, which indicate an adoption of a new home range (Nussear 2004).

We cannot predict the direction that translocated animals are likely to move. In some studies, translocated desert tortoises have exhibited a tendency to orient toward the location of their capture and attempt to move in that direction (Berry 1986), but in other instances, no discernible homing tendency has been observed in translocated animals (Field et al. 2007). Information

specific to short-distance translocations indicates that at least some individuals will attempt to return to their former home ranges after release (Stitt et al. 2003, Rakestraw 1997).

Based on the distribution of desert tortoises outside the Mojave Solar facility site, we anticipate that Abengoa is most likely to translocate desert tortoises from the edges of the solar facility site, less than 500 meters. We anticipate that these individuals are likely to move much shorter distances and remain within the maximum straight-line dispersal distance observed for male desert tortoises (1.5 kilometers) discussed above for short-distance translocations. Because of the limited resources on the site, we anticipate that any desert tortoise found on the solar facility site maintains a territory adjacent to the site and therefore is less likely to wander following translocation. However, because the action area for this project includes buffers that encompass all the contiguous desert tortoise habitat extending outside the translocation areas based on the dispersal distances predicted for desert tortoises to move following translocation, we anticipate that all translocated animals, including any that make long-distance movements, will remain in the action area. Following the first hibernation period after translocation, individuals are likely to reduce movement distances and establish new home ranges.

In one study, the majority of the dispersal movement away from the release site occurred during the first 2 weeks after translocation (Field et al. 2007). During this time and over the period prior to home range establishment, desert tortoises may experience higher potential for mortality because they are moving great distances through unfamiliar territory and are less likely to have established cover sites for protection. Desert tortoises that make long-distance movements following translocation can travel for 5 to 10 days and average 671.5 yards per day (Berry 1986). Studies have documented various sources of mortality for translocated individuals, including predation, exposure, fire, disease, crushing by cattle, and flooding (Nussey 2004, Field et al. 2007, Berry 1986, U.S. Army 2009, 2010). Of these, predation appears to be the primary source of mortality in most translocation studies (Nussey 2004, Field et al. 2007, U.S. Army 2009, 2010). Based on the description of the action area in the Environmental Baseline section of this biological opinion, the potential exists for all the sources of mortality to occur within the action area, with the exception of crushing by cattle. However, fire is likely to be localized and highly dependent on the abundance of non-native grasses and other weeds. In addition to these threats, the potential exists for desert tortoises to be killed on roads during the period when translocated individuals are seeking new home range locations. However, since most of Harper Lake Road is fenced to exclude desert tortoises and Abengoa will monitor the road during the construction of the solar facility, road kills are unlikely to occur as a result of translocation.

Abengoa has selected translocation areas in desert tortoise habitat that should serve as suitable recipient sites for these animals based on habitat suitability and proximity to home ranges of the translocated animals. It has proposed numerous protective measures in its translocation plan that are likely to reduce the potential for mortality of translocated individuals.

Studies have documented mortality rates of 0, 15, 21, and 21.4 percent of translocated animals in other areas (Nussey 2004, Cook et al. 1978 in Nussey 2004, Field et al 2007). Nussey (2004) found that mortality among translocated animals was not statistically different from mortality

observed in resident populations. This study did not compare mortality rates in resident populations to those in control groups; therefore, we cannot determine if the translocation caused increased mortality rates in the resident population. In addition, Esque et al. (2010) found that mortality rates in resident (29 of 140 desert tortoises; 20.7 percent mortality), control (28 of 149 desert tortoises; 18.8 percent mortality), and translocated populations did not differ statistically and concluded that the translocation was not the cause of the observed mortality. With the exception of the Esque et al. (2010) study, none of the studies cited in this paragraph used controls to compare mortality rates in resident and translocated populations to the mortality rate experienced in populations not affected by translocation.

Based on the information that we have gathered and considering the uncertainty of site-specific applicability, we estimate that, once moved, translocated and resident desert tortoises are likely to experience mortality rates of approximately equal proportions due to predation, exposure, fire, disease, crushing by vehicles, and flooding. Additionally, Esque et al. (2010) determined that mortality rates of translocated and resident desert tortoises are not likely to differ significantly control populations. We conclude that mortality rates in the resident and translocated populations are unlikely to be elevated above levels that these populations would experience in the absence of translocation.

Juvenile desert tortoises will comprise a portion of the overall mortality predicted above for resident and translocated populations. We anticipate that translocated juveniles are likely to experience a higher mortality rate than translocated subadult and adult desert tortoises, simply because smaller and younger desert tortoises in general have higher mortality rates than larger individuals. Because we anticipate that Abengoa will move few, if any, juvenile desert tortoises, we do not anticipate large numbers of juveniles will die as a result of translocation. We have discussed juvenile mortality during construction below. Because juvenile desert tortoises experience high mortality rates under natural circumstances, many of these individuals would likely not survive to reproductive age in the absence of project-related effects.

A limited potential exists desert tortoise eggs may be detected on the site of the proposed solar facility; if they are found, the authorized biologist would move them outside of the proposed solar site, according to current protocols. The movement of eggs poses some risk to the eggs; that is, they may not hatch as result of the movement. We have assumed that up to 29 eggs may be present on the site. If the eggs failed to survive translocation, this loss would not have an appreciable effect on desert tortoise numbers in the region in the long-term because of the relatively small number of eggs and their high natural mortality rate.

Post-translocation Monitoring

Based on the low numbers of desert tortoises expected to be found on the solar facility site, we estimate that Abengoa would attach transmitters to no more than four desert tortoises (of all sizes) to facilitate monitoring of the translocated populations. The periodic monitoring and handling of individuals with transmitters to perform visual health assessments and assess body condition may cause elevated levels of stress and render these animals more susceptible to

disease or dehydration from loss of fluids. Because Abengoa will use experienced biologists, approved by the Service, CEC and CDFG, and approved handling techniques, these desert tortoises are unlikely to experience substantially elevated stress levels resulting from handling and monitoring activities.

Construction of the Mojave Solar Facility

Because Abengoa would fence and remove all desert tortoises from the project site prior to the onset of construction, we anticipate that construction is unlikely to injure or kill subadult and adult desert tortoises on the solar facility site. Some potential always exists that surveyors may miss an individual during clearance surveys and construction monitoring. We cannot predict how many subadult and adult desert tortoises that clearance surveys and construction monitoring would miss. However, because Abengoa will use qualified biologists, authorized by the Service for clearance surveys, we anticipate the number is likely to be small.

In addition, juvenile desert tortoises and eggs are difficult to detect during clearance surveys and construction monitoring; therefore, the potential exists that surveyors may miss most of them and they are likely to remain in the work areas during construction. Construction activities are likely to kill juvenile desert tortoises and eggs that surveyors miss during clearance surveys or project monitoring. As noted in the Environmental Baseline section of this biological opinion, we are assuming that four desert tortoises and five nests may be present on site. We anticipate that construction may kill or injure any individuals and destroy any nests present, if they are not translocated from the site. Because juvenile desert tortoises and eggs experience high mortality rates under natural circumstances, many of these individuals would be unlikely to survive to reproductive age in the absence of project-related effects.

Construction of the Mojave Solar facility will increase the amount of traffic on Harper Lake Road. Although much of the road is fenced to exclude desert tortoises, gaps remain along the road to provide access to private property and utility crossings. The increased volume of vehicles along Harper Lake Road may increase the likelihood that a desert tortoise will be killed or injured by a vehicle strike; however, Abengoa should be able to reduce this threat by using a bussing service from Barstow to reduce the amount of vehicle traffic coming to the solar facility site during construction and having a biological monitor patrol Harper Lake Road when desert tortoises are active and at times of peak traffic.

The proposed speed limit of 25 miles per hour on Harper Lake Road may prevent some desert tortoises from being killed or injured. This speed is too high to allow drivers to see smaller desert tortoises; inattentive drivers are also likely to strike larger desert tortoises at this speed. In general, because most of the access route is fenced and the bussing service and patrols should reduce vehicle use and the presence of desert tortoises on the road, respectively, we expect that few desert tortoises are likely to be killed or injured on Harper Lake Road. (We note that drivers other than those associated with Abengoa will use Harper Lake Road and may be responsible for the injury and mortality of desert tortoises.)

Operations and Maintenance of the Mojave Solar Facility

Abengoa plans to conduct most operation and maintenance activities inside the desert tortoise exclusion fence over the minimum 30-year life of this project; however, Abengoa may perform some ground-disturbing maintenance activities outside of fenced areas while conducting repair of the perimeter fence. Activities associated with fence repair have the potential to injure or kill desert tortoises primarily as a result of vehicle strikes, as workers travel to and from work sites outside of the fenced areas, by workers walking the perimeter of the fence during inspections, and during repair of the perimeter fence. Additionally, if the perimeter fence is damaged, desert tortoises that enter the facility could be killed or injured during routine activities. We cannot predict how many desert tortoises might be killed or injured by such activities because we cannot predict how often the fence would require repair, whether desert tortoises would be present when the repair occurred on the fence, or if desert tortoises would enter the facility while the fence is damaged. Finally, protective measures undertaken during the repair of the fence are likely to reduce the number of desert tortoises that would otherwise be killed or injured. In general, we expect few desert tortoises to be killed or injured during operation and maintenance of the solar facility because we do not expect activities outside of the fence to occur on a frequent basis.

Accessing the Mojave Solar Facility during Operation

The access road to the Mojave Solar facility is Harper Lake Road. Although much of the road is fenced with desert tortoise exclusion fencing, gaps remain along the road to provide access to private property and utility crossings. Vehicles traveling along Harper Lake Road during operation have the potential to kill or injure desert tortoises entering the roadway. Although the CEC has required a speed limit for operations of 25 miles per hour (condition of certification BIO- 7 [CEC 2010b]), CEC may choose to modify this condition and workers may travel 55 miles per hour, which is the county-designated speed limit on Harper Lake Road. Additionally, drivers not associated with this project will be traveling the road at 55 miles per hour. Therefore, for the purpose of this analysis, we will consider the effects of the higher speed limit.

At 55 miles per hour, drivers are highly unlikely to see and avoid desert tortoises. We cannot predict how many individuals will be killed or injured because of the variables involved, such as weather conditions, the nature and condition of the road, and activity patterns of desert tortoises at the time the road is being used; however, we expect this number to be small, primarily because large portions of the road have been fenced to exclude desert tortoises. Finally, we will not be able to distinguish whether desert tortoises are killed by drivers associated with the Mojave Solar Project or others using the road.

Partial Loss of Desert Tortoise Home Ranges

Desert tortoise home ranges vary greatly in size; therefore, we cannot determine how many desert tortoises will actually lose part of their home range as a result of the construction of the Mojave Solar facility. However, given the marginal quality of desert tortoise habitat and the limited amount of desert tortoise scat and burrows observed on the Mojave Solar facility site, we

expect that desert tortoises are not using the solar facility site on a consistent basis. Therefore, we anticipate the potential partial loss of home ranges will not have a measurable effect on the desert tortoises outside of the solar facility site.

Installation of SCE's Fiber Optic Lines

Potential Injury and Mortality of Desert Tortoises

We anticipate that SCE would capture and move all subadult and adult desert tortoises from harm's way from activities associated with the installation of the fiber optic lines. Because of the difficulty in locating juvenile desert tortoises, SCE may not find all the juveniles along the fiber optic lines and thus may move some but not all juvenile desert tortoises from this area.

The installation of the 3 fiber optic line routes would cross 65 miles of desert tortoise habitat. Vehicles and workers associated with this activity have the potential to crush desert tortoises or burrows with desert tortoises or eggs inside. These effects would be most likely to occur during initial ground clearance of pole sites, staging areas, and new roads when desert tortoises are the most difficult to detect because of vegetation and other types of cover. Because SCE would affect a relatively small area (i.e., 23.11 acres) along 65 miles of transmission line, we expect that few desert tortoises would be affected by ground-disturbing activities.

Uninformed workers could also injure or kill desert tortoises intentionally or inadvertently. They may also collect desert tortoises as pets.

Vehicles traveling along right-of-way and access roads may strike desert tortoises and injure or kill them. Desert tortoises are most vulnerable at times of the year when they are most active and on roads that contain numerous rises, dips, and turns, which reduce the driver's ability to see and avoid them. Desert tortoises occasionally take shelter under parked vehicles; they can then be injured or killed when the vehicle is moved.

Existing access and right-of-way roads that are in good condition may pose a greater risk to desert tortoises because their better condition would allow vehicles to move faster; conversely, desert tortoises are more difficult to detect and avoid on roads that are in poor condition. After construction, members of the public would likely begin to use the 6.15 miles of new access road; in the long term, this use would likely have the greatest effect on desert tortoises because they would not be required to implement any of the protective measures that SCE's workers would use.

The Bureau has proposed numerous measures to avoid or reduce the number of desert tortoises that may be injured or killed by these activities. For example, when construction occurs in potentially occupied habitat, work and staging areas may be fenced with desert tortoise exclusion fence, and during all activities, all vehicles will remain on existing access and spur roads in potentially occupied habitat. SCE will use authorized desert tortoise biologists to move desert tortoises from harm's way and place them in adjacent habitat, no greater than 500 meters away.

SCE will limit vehicle speeds to 15 miles per hour to attempt to see desert tortoises that may be in the road. At this speed, workers may see larger desert tortoises but smaller animals, being less visible, will be at greater risk of being struck by vehicles; even larger desert tortoises are not visible at turns and rises in the road. Workers will be instructed to check under vehicles and, if a desert tortoise is present, to either wait until it has left of its own accord or to summon an authorized biologist to move the animal from harm's way.

SCE's proposal to work only during daylight hours (except during emergencies) would be protective of desert tortoises because they would be more difficult to detect and avoid in the dark.

Because of these reasons, we anticipate few, if any, desert tortoises are likely to be injured or killed during the installation of the fiber optic lines. Our primary reasons for reaching this conclusion are that the Bureau and SCE have proposed to undertake numerous measures to avoid or reduce the number of individuals that are injured or killed and the estimated number of desert tortoises we expect to occupy the linear areas is low.

Capture and Movement of Desert Tortoises

We cannot determine precisely how many desert tortoises along the fiber optic line will be moved from harm's way. Because a relatively small area would be disturbed by the installation of the fiber optic lines, we expect few, if any, desert tortoises or eggs will require relocating. The likelihood of encountering an animal in any particular area at any given time is low and moving any desert tortoises found the relatively short distances proposed by SCE is highly unlikely to result in measurable biological effects. These short-distance movements would likely expose the desert tortoise that is moved to other desert tortoises and habitat with which it is already familiar, because of the size of their home territories. We have provided a thorough discussion of the potential effects of moving desert tortoises in the Effects of the Translocation Strategy section of this biological opinion. We anticipate that the effect of moving any desert tortoise from harm's way along the fiber optic line installation will result in few, if any, desert tortoises being injured or killed because of the short distance individuals will be moved and because SCE will use approved handling techniques and authorized biologists approved by the Service, Bureau, and CDFG to handle the desert tortoises.

Loss of Habitat

Mojave Solar Facility

Construction of the Mojave Solar facility would cause the long-term loss of a maximum of 428.74 acres of desert tortoise habitat. The following table provides details on the habitat loss associated with the Mojave Solar facility. The remaining 1,336 acres are composed of fallow agriculture (ruderal), active agriculture, desert sink scrub, tamarisk scrub, dry lake bed, and disturbed and developed lands (CEC 2010b); none of these areas are desert tortoise habitat.

Vegetation Type	Acreage of Permanent Impacts
Disturbed–Saltbush Scrub Regrowth	223.8
Desert Saltbush Scrub	0.74
Fallow Agricultural–Saltbush Scrub Regrowth	202.9
Disturbed Desert Saltbush Scrub	1.3
Total Acreage	428.74

Fiber Optic Line Installation

Installation of the fiber optic lines would result in the loss of approximately 23.11 acres of desert tortoise habitat along the 3 routes; this total includes 11.51 acres along 32.79 miles of line that would cross critical habitat, which we discussed previously in this biological opinion, and 11.6 acres along approximately 32 miles of line within desert tortoise habitat but outside of critical habitat. For critical habitat, we determined that the disturbed areas were so small and distributed in such a linear manner that the disturbance, as a whole, did not cause a measurable effect. With the exception of the 2 new access roads, which would disturb 4.85 and 1.12 acres, the disturbance associated with the installation of the fiber optic lines also occurs in small patches in a linear distribution. Consequently, we again consider these effects to not have a measurable effect on habitat of the desert tortoise.

The loss of 5.97 acres of desert tortoise habitat for the construction of 2 new access roads may affect desert tortoise habitat by fragmenting habitat to a minor degree, introducing non-native plant species into surrounding area, and allowing for additional human access into previously undisturbed areas, which could, in turn, result in further disturbance to habitat. In this case, however, the new routes would be sited near areas that already exhibit some amount of disturbance. Consequently, the loss of approximately 5.97 acres of habitat in this area of the Western Mojave Recovery Unit will not have a substantial adverse effect on the desert tortoise.

Combined, the proposed project could result in the loss of up to 451.85 acres of desert tortoise habitat. We estimate that the Western Mojave Recovery Unit contains approximately 12,475 square miles of potential desert tortoise habitat (Waln 2011, see Status of the Desert Tortoise - Status and Trends of Desert Tortoise Populations section of this biological opinion). The habitat that would be disturbed on a long-term basis by the proposed project constitutes a small fraction of the remaining modeled habitat in the Western Mojave Recovery Unit. (I.e., 451.85 acres equals 0.71 square miles; 0.71 divided by 12,475 equals 0.00006; 0.00006 multiplied by 100 equals 0.0057 percent of the remaining modeled habitat in the Western Mojave Recovery Unit.) It is also located outside of any area that the Service considers important for the long-term conservation of the desert tortoise (i.e., critical habitat unit or desert wildlife management area) and likely linkage between such areas. Therefore, the proposed action is not likely to affect the distribution of the desert tortoise in a substantial manner.

Restoration and Reclamation Activities

The construction laydown areas required for the SCE fiber optic line installation may result in soil excavation or surface scouring in undisturbed areas supporting native vegetation. SCE will

implement several measures to restore the habitat if such disturbance occurs. Restoration activities will include stockpiling of native soil from the disturbed area and using seed from locally occurring species during planting. Stockpiling of topsoil has the potential to injure or kill desert tortoises if they or their burrows are buried by stored soil. SCE will only store soil in disturbed areas that do not provide habitat for desert tortoises and are approved by an authorized biologist. Consequently, restoration activities will likely not injure or kill any desert tortoises. Restoration personnel traveling to and from work sites may strike a desert tortoise with their vehicles; because road use related to restoration work would be relatively limited in duration, we expect that few, if any, desert tortoises would be injured or killed by these activities.

Abengoa has not proposed any restoration or reclamation activities for the Mojave Solar facility.

Miscellaneous Effects

Miscellaneous effects include increased predation by common ravens, modification of the habitat and diet of desert tortoises due to the spread of non-native plant species, and toxic chemical use during operation of the solar field.

Common ravens are attracted to human activity in the desert. Securing trash and reducing other subsidies will likely reduce the attractiveness of the solar facility to predators. Implementation of a common raven management plan for each portion of the proposed project will include active management of subsidies (e.g., evaporation ponds) associated with the solar facility and fiber optic lines. We expect that common ravens are still likely to frequent the solar facility site because it would offer perching, roosting, and nesting sites within the solar field. In addition, the new poles along the fiber optic line and the line will provide new perching and roosting opportunities. Consequently, the proposed project has the potential to attract common ravens to some degree and lead to further predation on desert tortoises in the vicinity; the proposed measures to monitor use of the site by common ravens and to attempt to remove any subsidies are likely to reduce the attractiveness of the facility to these birds to some degree.

Abengoa and SCE will contribute funds to the regional common raven management program to address the indirect and cumulative impacts associated with project development that facilitate the expansion of common raven populations into desert tortoise habitat. The one-time fee of \$105 per acre of land permanently disturbed by the solar facility site and fiber optic line installation will fund the project's portion of the regional common raven management plan for the 30-year life of the project anticipated by the DOE. Abengoa and SCE's funding of the regional management plan for common ravens will contribute to a large-scale management action that the Service and other agencies are undertaking to control and manage common ravens on a regional basis. We expect that implementation of this plan will promote the recovery of the desert tortoise by reducing the number of common ravens that prey on desert tortoises and by implementing actions that are likely to reduce subsidies for common ravens on a regional basis.

Non-native plant species currently occur on the proposed project site and are likely to occur in other portions of the action area at varying densities. Within the action area, numerous features

serve as vectors for infestation by non-native plant species (e.g., BNSF railroad, Highway 395). However, construction and operation of the Mojave Solar Project have the potential to increase the distribution and abundance of non-native species within the action area due to ground-disturbing activities that favor the establishment of non-native species. In addition, access to the project site and other project features by construction and operations personnel are likely to increase the volume and distribution of non-native seed carried into the action area. The increased abundance in non-native species associated with this project may result in an increased fire risk, which may result in future habitat loss. Abengoa and SCE have proposed numerous measures to address control of non-native plant species within the project site. We cannot reasonably predict the increase in non-native species abundance that this project will create within the action area, but we anticipate that the program proposed by Abengoa and SCE will be reasonably effective in reducing the increase in some species. However, we anticipate that the amount of disturbance created by the 1,765-acre solar field and the 85.28 miles of fiber optic line installation will result in an increase in the abundance of non-native species and thereby elevate the risk of fire, which, in turn, heightens the risk of future loss of desert tortoises and their habitat.

The Mojave Solar facility proposes to use a variety of chemicals for processing water and generating solar energy. These chemicals have the potential to adversely affect desert tortoise by decreasing their general health, reproduction and survival rate through dermal contact or via ingestion of contaminated plants, if the compounds are toxic and released from the solar facility site. The Mojave Solar facility is designed to minimize the migration of aqueous chemical compounds beyond the site perimeter and all chemical solids that need to be removed from the solar facility site will be hauled to a landfill that is authorized to receive that class of waste material. We expect that the proper handling of chemicals on the solar facility site and the design features of the solar facility will prevent any measurable effect of the facility's chemicals on desert tortoises adjacent to the solar facility site.

Summary

Abengoa and SCE will implement numerous measures to avoid, minimize, reduce, and offset the adverse effects on the desert tortoise of the proposed action. The area of the proposed solar facility site supports few, if any, desert tortoises; for the purposes of this analysis, we have assumed that four desert tortoises and five nests may occur in this area; because of the linear nature of the fiber optic lines we did not provide an estimate of desert tortoises for that portion of the project. We expect that most desert tortoises encountered during work activities will be moved relatively short distances out of harm's way at both the solar facility site and along the fiber optic lines. Abengoa will capture and translocate any desert tortoises or eggs found during construction of the Mojave Solar facility site. Because Abengoa and SCE will implement a variety of measures to reduce stress to these animals and because the animals will be released within or close to their home range, we do not anticipate that injury or mortality will result from the handling and movement of these animals.

Following release of translocated animals, we anticipate that mortality rates in the resident and translocated populations are unlikely to be elevated above normal levels. Abengoa will also assess the health of the resident desert tortoises within the buffer areas around translocated desert tortoises. We do not anticipate the handling for the purposes of health assessments or the collection of blood samples will result in substantial adverse effects because Abengoa will use experienced biologists who would be approved by the Service and approved handling techniques.

Because Abengoa will surround all of its work areas with exclusion fencing, perform clearance surveys on all work areas, and implement numerous measures to prevent injury and mortality of desert tortoises, we anticipate that construction of the Mojave Solar facility, including use of access routes, is likely to kill or injure few, if any, subadult and adult desert tortoises. Because of the difficulty detecting and removing them, we estimate that project construction may kill or injure at least some of the juvenile desert tortoises that occur on site.

Following construction, we anticipate that operations and maintenance within the permanently fenced portions of the Mojave Solar facility would kill or injure few, if any, subadult and adult desert tortoises; such events are only likely to occur in the event that a portion of the exclusion fencing is washed out and a desert tortoise gains access to the site. We anticipate that this occurrence would be rare. With the exception of activities associated with fence repair, all maintenance activities for the project site will occur within the permanent desert tortoise fencing. Because of the protective measures that Abengoa will implement and the nature of the fence repair activities, we anticipate fence maintenance activities will kill or injure few, if any, desert tortoises. Abengoa has not identified any specific maintenance activities, other than fence repair after storm events, which will be conducted outside of the desert tortoise fencing; any future activities that have not been analyzed in this biological opinion may require additional consultation. Because desert tortoise will still have access, although limited, to Harper Lake Road, some potential exists for desert tortoises to be injured or killed by personnel traveling to and from the Mojave Solar facility.

During installation of the fiber optic transmission line, desert tortoises could be injured or killed by vehicles traveling the right-of-way. Because SCE will implement numerous measures to avoid and minimize the potential for desert tortoises enter the work areas and to be crushed by vehicles, we anticipate that few, if any, desert tortoises will be injured or killed as a result of this portion of the proposed action.

Construction, operation, and maintenance of the Mojave Solar Project have the potential to increase common raven predation on desert tortoises within the action area. In addition, this project is likely to result in an increased abundance of non-native plant species and a subsequent increase in fire frequency within the action area. The measures proposed by Abengoa and SCE to address these threats will reduce the magnitude of these effects, but some level of adverse effect will likely persist. We cannot reasonably predict the number of desert tortoises that these threats will adversely affect.

The areas disturbed by the proposed solar facility site would no longer support reproduction of desert tortoises; to the best of our knowledge, desert tortoises do not currently reproduce in this area. Any desert tortoises that are moved from the site of the proposed solar field or from along the fiber optic lines would likely continue to reproduce in adjacent habitat. Consequently, we anticipate that the proposed action will not appreciably diminish the reproductive capacity of the species, particularly in light of the few desert tortoises that would be affected.

Implementation of the proposed action would not appreciably reduce the number of desert tortoises in the Western Mojave Recovery Unit. We anticipate that most of the desert tortoises encountered on this project will be moved from harm's way and placed in area within their home range. Because so few desert tortoises are likely to be affected by the proposed project (i.e., both the solar facility site and the fiber optic lines), the effect of the change in the number of individuals within the recovery unit that may result from the proposed action would not be measurable.

The distribution of the desert tortoise would be minimally reduced, as a result of the long-term disturbance associated with the proposed action (i.e., 451.85 acres). Consequently, the development of the Mojave Solar Project would result in the loss of approximately 0.0057 percent of the habitat in the Western Mojave Recovery Unit.

Given that the effects of this project on desert tortoises are not substantial, we do not anticipate that it will result in effects that appreciably reduce the current distribution, numbers, or reproduction of the overall population within the Western Mojave Recovery Unit or range wide. Taking into consideration the relative scale of the adverse effects in context with our current estimates of the species' status in the Western Mojave Recovery Unit and range wide, we do not anticipate that construction of this project would appreciably reduce the ability of the desert tortoise to survive and recover in the wild.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. According to the biological assessment, the only projects reasonably certain to occur in the action area include two road construction projects on State Route 58. Because the Federal Highway Administration has delegated the authority for consultation under section 7(a)(2) of the Act to the California Department of Transportation, the California Department of Transportation will serve as the lead Federal agency for the road projects; therefore, we are unaware of any future non-federal projects that are reasonably certain to occur on in the action area.

CONCLUSION

After reviewing its status, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert tortoise. We have reached this conclusion because:

1. Project activities are likely to kill or injure few desert tortoises because Abengoa and SCE will implement numerous measures to reduce the potential that desert tortoises will occupy project work sites (i.e., clearance surveys, exclusion fencing, translocation, qualified biologists, desert tortoise monitors).
2. The number of desert tortoises injured or killed as a result of translocation activities (e.g., blood tests, handling, quarantine, etc.) will be few, if any, because none were detected at the site of the proposed solar facility; any desert tortoises found onsite will be handled only by highly skilled biologists in accordance with techniques approved by the Service.
3. Post-translocation mortality in the translocated or resident populations is unlikely to be elevated above that experienced by desert tortoises not affected by translocation.
4. Abengoa and SCE will implement numerous measures to reduce the potential for increased predation by common ravens and spread of non-native plant species.
5. Regional management actions are likely to aid in reducing common raven predation of desert tortoises in a portion of the desert tortoise's range.
6. This project would not result in a substantial loss of desert tortoise habitat in areas that the Service or other agencies have designated for intensive management for the conservation of desert tortoises (e.g., desert wildlife management areas, critical habitat, etc.).

As we noted previously in this biological opinion, our analysis under section 7(a)(2) of the Endangered Species Act must be conducted in relation to the status of the entire listed taxon. We based the analysis in this biological opinion within the context of the Western Mojave Recovery Unit because of the wide range of the desert tortoise. Because we have determined that the effects of this action would not compromise the integrity of the Western Mojave Recovery Unit or impede the survival or recovery of the desert tortoise in a measurable manner in this portion of its range, we have not extended the analysis of the effects of this proposed action to the remainder of the range of the Mojave population of the desert tortoise.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of an incidental take statement.

The measures described in this document are non-discretionary. The DOE and Bureau, respectively, have a continuing duty to regulate the activities covered by the incidental take statement in this biological opinion, which are applicable to that agency's project. If the DOE or Bureau fails to include the terms and conditions of this incidental take statement as enforceable conditions of the loan guarantee or right-of-way grant, respectively, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the DOE and Bureau must report the progress of its action and its impact on the desert tortoise to the Service as specified in the incidental take statement [50 Code of Federal Regulations 402.14(i)(3)].

Translocation of Desert Tortoises from the Mojave Solar Facility

We anticipate that all desert tortoises within the site of the proposed solar facility will be taken. For the purposes of this biological opinion, we assumed that four desert tortoises and five nests are present within the solar facility.

Most of the desert tortoises within the project facility will be taken in the form of capture when they are translocated into adjacent habitat and have radio transmitters attached. We do not anticipate that the act of translocating desert tortoises is likely to kill or injure any desert tortoises. Individuals translocated greater than 500 meters will also be taken in the form of capture and harassment; the harassment would occur during the drawing of blood for disease testing. Although the drawing of blood presents some likelihood that individuals could be injured or killed, we do not anticipate that blood collection will result in the injury or mortality of any individuals; consequently, we have categorized this form of take as harassment.

The movement of five nests will involve the capture of all eggs they contain; we estimated that up to 29 eggs may be present on the site of the solar facility. Up to 29 eggs may be destroyed

(i.e., taken in the form of mortality) during their movement. We acknowledge that an egg that does not hatch after being moved may not have hatched if the nest had not been moved.

We anticipate that up to 542 resident desert tortoises within the action area of the Mojave Solar facility will be taken in the form of capture and harassment. The capture would occur during health assessments and the attachment and removal of radio transmitters. The harassment would occur during the drawing of blood for disease testing. Although the drawing of blood presents some likelihood that individuals could be injured or killed, we do not anticipate that blood collection will result in the injury or mortality of any individuals; consequently, we have categorized this form of take as harassment. We do not anticipate that the act of translocating desert tortoises is likely to kill or injure any desert tortoises.

Post-translocation Monitoring

We anticipate that four desert tortoises be taken as a result of post-translocation monitoring. These individuals will be taken in the form of capture when they are handled during the attachment and removal of transmitters and during health assessments (but not including additional drawing of blood). We do not anticipate that the attachment and removal of transmitters or additional health assessments will result in injury or mortality to desert tortoises.

Construction of the Mojave Solar Facility

We anticipate that all desert tortoises within the site of the proposed solar facility will be taken in the form of injury or mortality if they are not found during translocation and captured. For the purposes of this biological opinion, we assumed that four desert tortoises and five nests (29 eggs) are present within the solar facility.

Operations and Maintenance of the Mojave Solar Facility

We anticipate that desert tortoises will be taken in the form of capture, injury, or mortality during the operational phase of the proposed solar facility. We expect few desert tortoises will be taken during this time but cannot quantify this amount for several reasons. We cannot predict how often the fence would require repair, whether desert tortoises would be present when the repair occurred on the fence, or if desert tortoises would enter the facility while the fence is damaged. Finally, protective measures undertaken during the repair of the fence are likely to reduce the number of desert tortoises that would otherwise be killed or injured. Because we cannot quantify (i.e., predict) the amount of take associated with the operation of the solar facility, we will include a threshold for re-initiation of formal consultation for this potential source of take in the terms and conditions of this biological opinion.

Accessing the Mojave Solar Facility during Operation

We anticipate that desert tortoises will be taken by workers accessing the proposed solar facility via Harper Lake Road during its operational phase. These animals would be taken in the form of

injury or mortality, if struck by a vehicle, or in the form of capture, if they are moved from harm's way. We expect few desert tortoises will be taken during this time, primarily because most of the road has been fenced to exclude desert tortoises. We cannot quantify this amount for several reasons. Weather conditions, the nature and condition of the road, and activity patterns of desert tortoises at the time the road is being used influence the number of encounters between desert tortoises and vehicles and their outcomes (i.e., whether the desert tortoise is avoided, captured, injured, or killed). Additionally, we will not be able to distinguish whether desert tortoises are killed by drivers associated with the Mojave Solar Project or others using the road. Because we cannot quantify (i.e., predict) the amount of take associated with the operation of the solar facility, we will include a threshold for re-initiation of formal consultation for this potential source of take in the terms and conditions of this biological opinion.

Installation of SCE's Fiber Optic Lines

We anticipate that desert tortoises are likely to be taken during installation of SCE's fiber optic lines. We anticipate that most desert tortoises would be taken through capture when they are moved from harm's way; additionally, some desert tortoises are likely to be taken through injury or mortality during these activities. We expect that few desert tortoises would be taken, primarily because the proposed activities are not highly damaging to habitat and because of the location of the access roads near busy paved roads; we expect most take is likely to occur while workers are using access roads to install the fiber optic lines. We cannot quantify the amount for several reasons. Weather conditions, the nature and condition of the access road, whether desert tortoises are present when the activities occur, and the success of the protective measures influence the number of desert tortoises that will be captured, injured, and killed. Because we cannot quantify (i.e., predict) the amount of take associated with the installation of SCE's fiber optic lines, we will include a threshold for re-initiation of formal consultation for this potential source of take in the terms and conditions of this biological opinion.

We anticipate that the installation of the fiber optic lines is likely to result in the take of eggs of desert tortoises. Because of the small area that would be disturbed during this activity, we estimate that few eggs will be destroyed. We cannot estimate the number of eggs that may be taken because we do not know how many may be present during installation. Because we cannot quantify (i.e., predict) the amount of take of eggs associated with the installation of SCE's fiber optic lines, we will include a threshold for re-initiation of formal consultation for this potential source of take in the terms and conditions of this biological opinion.

Restoration and Reclamation Activities along SCE's Fiber Optic Lines

We anticipate that desert tortoises are likely to be taken during restoration and reclamation activities associated with SCE's fiber optic lines. We anticipate that most desert tortoises would be taken through capture when they are moved from harm's way; some desert tortoises are likely to be taken through mortality or injury during these activities. We expect that few desert tortoises would be taken, primarily because the proposed activities are not highly damaging to habitat and because of the location of the access roads near busy paved roads; we expect most

take is likely to occur while workers are using access roads to reach restoration sites. We cannot quantify the amount for several reasons. Weather conditions, the nature and condition of the access road, whether desert tortoises are present when the activities occur, and the success of the protective measures influence the number of desert tortoises that will be captured, injured, and killed. Because we cannot quantify (i.e., predict) the amount of take associated with SCE's restoration and reclamation activities, we will include a threshold for re-initiation of formal consultation for this potential source of take in the terms and conditions of this biological opinion.

The exemption to the prohibition against take provided by this incidental take statement applies only to activities conducted by Abengoa and SCE within the action area defined in this biological opinion.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the take of desert tortoises during the implementation of the Mojave Solar project:

1. The DOE or Abengoa, as appropriate, must ensure that desert tortoises do not enter fenced facilities at the Mojave Solar facility site.
2. The DOE, Abengoa, Bureau, and SCE, as appropriate, must ensure that the level of incidental take anticipated in this biological opinion is commensurate with the analysis contained herein.
3. The DOE or Abengoa, as appropriate, must ensure desert tortoises held in or being released from quarantine pens are not poached by humans or killed by natural predators.
4. The DOE, Abengoa, Bureau, and SCE, as appropriate, must ensure that the worker environmental awareness program includes a desert tortoise module.
5. The DOE, Abengoa, Bureau, and SCE, as appropriate, must ensure common raven use of the project components is minimized.
6. The DOE, Abengoa, Bureau, and SCE, as appropriate, must ensure that measures are taken to promote the survival of injured desert tortoises.

Our evaluation of the proposed action includes consideration of the protective measures described in the Description of the Proposed Action section of this biological opinion. Consequently, any changes in these protective measures may constitute a modification of the proposed action that causes an effect to the desert tortoise that was not considered in the biological opinion and require re-initiation of consultation, pursuant to the implementing regulations of the section 7(a)(2) of the Act (50 Code of Federal Regulations 402.16).

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Bureau, DOE, Abengoa, and SCE must comply with the following terms and conditions, which implement the reasonable and prudent measures described in the previous section, or make them enforceable conditions of the right-of-way grants or loan authorization. The Bureau, DOE, Abengoa, and SCE, as appropriate, must also fulfill the reporting and monitoring requirements. These conditions are non-discretionary.

1. The following term and condition implements reasonable and prudent measure 1:

The DOE or Abengoa, as appropriate, must monitor the effectiveness of the access gates at keeping desert tortoises out of the project site. If any desert tortoises access the site through the gates, the DOE or Abengoa, as appropriate, must contact the Service as soon as it is aware of the incident. In coordination with the Service, the DOE or Abengoa, as appropriate must implement adaptive measures to prevent further access of the solar facility site by desert tortoises. These measures may include, but are not limited to, repair of damage to the gate, redesign of the gate, and altered management of the gate.

2. The following terms and conditions implement reasonable and prudent measure 2:

- a. To ensure that the measures proposed by the DOE, Bureau, Abengoa, and SCE are effective and are being properly implemented, the DOE, Abengoa, Bureau, or SCE, as appropriate, must contact the Service immediately if it becomes aware that a desert tortoise has been killed or injured by project activities. At that time, the DOE, Abengoa, Bureau, or SCE, as appropriate, must review the circumstances surrounding the incident with the Service to determine whether additional protective measures are required. Project activities may continue during the review, provided that the proposed protective measures in the project description and any appropriate terms and conditions of this biological opinion have been and continue to be fully implemented.
- b. If two desert tortoises are injured or killed as a result of construction, operation, and maintenance of the Mojave Solar facility, consultation must be re-initiated on the proposed action, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16. This term and condition also applies to injury and mortality of desert tortoises during translocation and post-translocation monitoring of the translocated populations (i.e., due to handling, road kills, or other effects caused by personnel working on the project). However, it does not apply to post-translocation mortality within these populations that is not connected directly to an action required to carry out the translocation and monitoring effort (e.g., predation) or to injury or mortality observed along Harper Lake Road during operations and maintenance.

- c. If more than two desert tortoises per year are killed or injured on Harper Lake Road during the operation of the Mojave Solar facility, consultation must be re-initiated on the proposed action, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16.
 - d. If two desert tortoises are killed or injured as a result of installation, restoration, and reclamation activities of the SCE fiber optic lines, the Bureau must re-initiate consultation on the proposed action, pursuant to the implementing regulations for section 7(a)(2) of the Endangered Species Act at 50 Code of Federal Regulations 402.16. This term and condition also applies to restoration and reclamation work that would be conducted after installation.
3. The following terms and conditions implement reasonable and prudent measure 3:
- a. If a desert tortoise is injured or killed by predators or if predators are observed exhibiting interest in any quarantine pens, the DOE or Abengoa, as appropriate, must immediately secure the pens from the predators that were observed or post a monitor at all times necessary to ensure that desert tortoises are not taken. Upon implementation of these measures, the DOE or Abengoa, as appropriate, must contact the Service to develop long-term measures to secure the desert tortoises from predation.
 - b. If a predator is observed being attracted to the juvenile pens, the DOE or Abengoa, as appropriate, must ensure that the desert tortoises are not released as described in the Description of the Proposed Action section of this biological opinion. The DOE or Abengoa, as appropriate, must contact the Service to develop an alternative release strategy to reduce the likelihood that juveniles will be taken.
4. The following term and condition implement reasonable and prudent measure 4:
- The DOE, Abengoa, Bureau, and SCE, as appropriate, must ensure that the worker's environmental awareness plans include a special emphasis on desert tortoises, including information on physical characteristics, distribution, behavior, ecology, sensitivity to human activities, legal protection, penalties for violations, reporting requirements, and protection measures. The program must also include photographs of desert tortoises and their burrows.
5. The following terms and conditions implement reasonable and prudent measure 5:
- a. All new transmission lines associated with the Mojave Solar facility site and SCE's new fiber optic lines and new poles must be designed in a manner that will reduce the likelihood of nesting by common ravens. The DOE, Abengoa, Bureau, and SCE, as appropriate, must monitor these transmission and fiber optic lines and associated poles to ensure the effectiveness of their measures and implement adaptive management, in coordination with the Service, if the initial measures are unsuccessful. The Bureau and

SCE must ensure that any common ravens nests established on new fiber optic facilities are removed within one year when they are inactive.

- b. The DOE or Abengoa, as appropriate, must ensure that the effectiveness of its management plan at reducing subsidies for common ravens is monitored for 5 years following completion of the project. After this initial period, the DOE or Abengoa, as appropriate, must ensure that monitoring is conducted once every 5 years, unless results indicate more or less frequent monitoring is necessary.
6. The following term and condition implements reasonable and prudent measure 6:
- If an injured desert tortoise is located during project construction, maintenance, or operation, the authorized biologist must assess the extent of the injuries and the potential for the desert tortoise to survive. If the authorized biologist determines that the desert tortoise would benefit from veterinary care, the desert tortoise must be taken immediately to a qualified veterinarian. If the desert tortoise is unlikely to survive, it must be humanely euthanized under the direction of or by a qualified veterinarian.

REPORTING REQUIREMENTS

Within 60 days of the construction of the proposed solar facility and installation of the fiber optic lines, the DOE, Bureau, Abengoa, or SCE, as appropriate, must provide reports to the Service that provide details on the effects of the actions on the desert tortoise; if the construction or installation require longer than a year, annual reports must be provided by December 31. The DOE or Abengoa, as appropriate, must also provide an annual report by December 31 of each year during operation and maintenance of the solar facility site. Specifically, these reports must include information on any instances when desert tortoises were killed, injured, or handled; the circumstances of such incidents; and any actions undertaken to prevent similar instances from re-occurring. In addition, these reports should provide detailed information on the results of translocation monitoring to include the following: 1) location of all translocated desert tortoises, 2) mortality rate of the population, and 3) health status and body condition of all translocated desert tortoises. The Bureau and SCE must submit the same information with regard to the fiber optic lines; this information may be included in the annual report that SCE provides with regard to its operation and maintenance work.

We recommend that the DOE and Bureau provide us with any recommendations that would facilitate the implementation of the protective measures while maintaining protection of the desert tortoise. We also request that the Bureau provide us with the names of any monitors who assisted the authorized biologist and an evaluation of the experience they gained on the project; the qualifications form on our website (http://www.fws.gov/ventura/sppinfo/protocols/deserttortoise_monitor-qualifications-statement.pdf), filled out for this project, along with any appropriate narrative would provide an

appropriate level of information. This information would provide us with additional reference material in the event these individuals are submitted as potential authorized biologists for future projects.

DISPOSITION OF DEAD OR INJURED DESERT TORTOISES

Within 3 days of locating any injured or dead desert tortoises, you must notify the Ventura Fish and Wildlife Office by telephone (805 644-1766) and by facsimile (805 644-3958) or electronic mail. The report must include the date, time, location of the carcass, a photograph, cause of death, if known, and any other pertinent information.

We will advise you on the appropriate means of disposing of the carcass when you contact us. We may advise you to provide it to a laboratory for analysis. Until we provide information on the disposition of the carcass, you must handle it such that the biological material is preserved in the best possible state for later analysis. If possible, the carcass should be kept on ice or refrigerated (not frozen) until we provide further direction.

Injured desert tortoises must be taken to a qualified veterinarian for treatment. If any injured desert tortoises survive, the Service must be contacted regarding their final disposition.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend that the DOE work with Abengoa and the Service to determine if the transmitters on desert tortoises can be used to answer additional research questions related to translocation or desert tortoise biology. We recommend that the Bureau and SCE retrofit the remainder of the transmission lines leading from the Mojave Solar facility to prevent common ravens from nesting on the poles. To address the indirect and cumulative effects of the installation of the fiber optic lines with regard to common ravens, we recommend that SCE contribute the appropriate additional funds to the regional common raven management program, using the formula on the Desert Managers Group web site.

The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

REINITIATION NOTICE

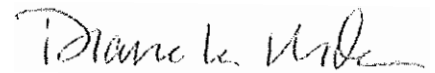
This concludes formal consultation on the DOE's proposal to issue a loan guarantee to Abengoa for the construction and operation of Mojave Solar facility and the Bureau's proposal to issue five right-of-way grants to SCE for installation of the fiber optic lines associated with the

Mojave Solar Project in San Bernardino County, California. Re-initiation of formal consultation is required where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) if a new species is listed or critical habitat designated that may be affected by the identified action (50 Code of Federal Regulations 402.16).

In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending re-initiation.

If you have any questions regarding this biological opinion, please contact Ashleigh Blackford of my staff at (805) 644-1766, extension 234.

Sincerely,

A handwritten signature in black ink, appearing to read "Diane K. Noda".

Diane K. Noda
Field Supervisor

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